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NO MORE SUBMARINES NEEDED AT PRESENT.

The United States government has now seven submarines in various stages of construction which would seem ample for purposes of experimentation; yet an active lobby is kept at Washington to induce congress to purchase more. Latterly it has been charged that efforts of a more direct character have been advanced to promote the necessary legislation. Mr. Lessler of the naval committee testifies that he was offered $5,000 to vote for more Holland submarines. A committee of inquiry has been appointed to investigate the charges and much conflicting testimony has been adduced. Mr. Lessler seems to have been approached in a very mysterious manner. Submarine navigation was talked to him by genial gentlemen in a very genial way; they endeavored to persuade him that the cause was most meritorious and one fellow, who seems to have had no connections whatever with any company which could be traced, told him that there was $5,000 in it for him; an election official threatened him with defeat at the next election unless he voted properly, and altogether the pursuation of Mr. Lessler seems to have been upon the most approved order. It is not, however, with such devious ways as these that this article has to deal but rather to consider the practical efficiency of the submarine. Neither the bureau of construction nor the steam engineering branch of the navy department considers the submarine to be much more than a toy. They have a certain moral influence with the timid but they have yet to prove that they are practical engines of war. That a submarine can stay on the bottom for a certain length of time is certain for it has already done so; but that it can maneuver intelligently, that it has any sense of direction, that it is other than absolutely blind are yet to be shown. Granting that it had a sense of direction, granting that it was not blind, its limited cruising area still remains, an area so restricted as to practically unfit it to seek a foe. Submarines are fitted for their guidance with periscopes. Now the great disadvantage of these instruments of sight is that they convey no idea of distance. Objects which appear a great way off may really be at their very noses. Quite recently a boat steered by one went into an English harbor. Far away in the dim distance was a dock wall for which she laid course. The next instant it smashed its snout against that very wall. It was only a few inches away. Getting at the enemy is the first consideration in all naval warfare and the submarine, unfortunately, cannot get anywhere. The United States government certainly has submarines enough to demonstrate the advantages of the type and the case can be proved by them just as well as it could be by twenty more like them.

HERR BALLIN OPPOSED TO SUBSIDIES.

Herr Ballin, director general of the Hamburg-American Line, announces that the agreement signed at Cologne recently by the French Transatlantic company with the Morgan shipping combination did not provide for the former entering the combination, thereby confirming previous statements on the subject, but was simply the general traffic agreement of the North Atlantic steamship combination, which has been in existence for eleven years, and which also includes Dutch and Belgian lines. In view of the situation at present existing, he added, the French line would not enter the combination and the latter did not desire it to do so. Herr Ballin said that the German companies regretted the fact that the British government had subsidized the Cunard Line, not because they feared the competition of that line, but because it was a bad example for other countries, as if one country subsidized lines other countries might do likewise, till finally all subsidies would have to be abolished by an international agreement similar to the Brussels sugar convention. As for the Cunard Line, Herr Ballin did not believe it could successfully compete with the combination, even with its subsidy, because it did not recognize that modern conditions compelled working hand in hand with neighbors. He thought the Cunard Line's new large subsidized steamers were too expensive to be run at a profit, owing to their enormous consumption of coal. The British goverment, Herr Ballin asserted, was really giving to the Cunard Line new steamers outright, as it found the capital for building them, and subsidized the vessels sufficiently to cover the interest and the amortization of the new capital. France's experience, he further remarked, showed the deadening effects of state subsidies. Herr Ballin would exert influence to prevent the German government from imitating Great Britain's example. Means of transportation created at state expense were always failures when adequate commerce did not exist. The German lines were successful because the German merchants had the courage to export German products and buy return freight. Denmark had created a splendid free port at Copenhagen, and the Hamburg-American Line had been induced by Danish friends to establish a line between the United States gulf ports and Copenhagen, but the freight was not there. The only regular commodity offered was oilcake for cattle feed, but it was not in sufficient quantity to maintain the line. Hungary was trying to create direct communication between Fiume and New York, partly by force, for Austro-Hungarian emigrants would be compelled to use that line. The Hamburg-American and North German Lloyd companies, at the request of the Hungarian government, sent a commission to Hungary a year ago to investigate the possibilities of a direct New York line, but it was decided that it could not be made profitable, because the freight was not sufficient, and passengers preferred seven to ten day voyages to sixteen and eighteen day passages.

Explaining the Hamburg-American Line's present good business in a time of depression, Herr Ballin asserted that it was due to large exports, especially to the United States, South America and East Asia. All signs, he also said, indicated that the forthcoming passenger season would be very profitable.

The Cable Ship Silvertown laying the Pacific Cable.

CRUISER CONTRACTS DIVIDED.

The protest of President Henry G. Morse of the New York Ship Building Co., Camden, N. J., against the award of contracts for the two armored cruisers Tennessee and Washington to the Cramps, Philadelphia, has proved of avail. The cause of the disputants was taken before the president's cabinet and it was decided to give the contract for one cruiser to the Cramps and the other to the New York Ship Building Co. Originally both contracts were awarded to the Cramps upon the builder's plans, which were subsequently modified to substitute Babcock & Wilcox boilers for Niclausse. Both the Union Iron Works and the New York Ship Building Co. protested that the proceeding was irregular, in that it virtually permitted the Cramp company to alter its bid after all the bids were opened and had been made public. The New York Ship Building Co. was the lowest bidder for the two cruisers upon the government's plans, though its bid was higher than the modified bid of the Cramp company. The New York Snip Building Co. has a superb plant but has never built a warship. The cabinet decided to give it a contract for one cruiser upon its bid and the other at the same figure to Cramps, the Cramp company to use the government's specifications.

In an endeavor to break the freight blockade the Pennsylvania railway has decided to temporarily withdraw its 20-hour special between New York and Chicago. As this special has the right of way over everything else, freight trains have frequently been held on sidings for hours to let it pass. The company may discontinue some other of its fast trains until the freight traffic is restored to a normal basis.

Senator R. B. Howell has introduced a resolution in the state senate of Nebraska instructing the Nebraska representatives in congress to vote for a larger navy. Senator Howell was at one time a member of the navy department. He is a graduate of Annapolis.

Vessels Undergoing Repairs at Moran Bros. Co.'s Plant, Seattle, Wash.

MEETING OF MEN OF SCIENCE.

Interesting Addresses by Lord Kelvin and Mr. George Westinghouse at a Distinguished Gathering in London.

At Claridge's hotel in London, on the night of Jan. 9, Mr. George Westinghouse entertained at dinner a large company of British railway managers, financiers and scientists. Two speeches were made of unique interest. One of these was by Lord Kelvin, the other by the host of the occasion. Lord Kelvin's speech was of especial interest to Americans. In his tribute to Mr. Westinghouse he said:

"At this dinner of friends I would like to express a common sentiment which all must feel, our appreciation of the qualities of our charming and beloved host, Mr. Westinghouse. I am sure that Mr. Westinghouse's coming to England reminds us all of advantages that England has derived from his genius and perseverance and grand skill in bringing out for the public good so many of the results of science and inventiveness. There are many railway men present at this table, and many passengers by railways—which means that every inhabitant of our country is represented here. When people belonging to these two classes—the railway men and traveling public of Great Britain are gathered together as now, we can scarcely see Mr. Westinghouse without feeling how much we owe to him for the Westinghouse brake. (Applause).

"But Mr. Westinghouse has not stopped with his brake; he has gone on, and on, and on in America, flashing over again on this side of the Atlantic, and bringing his energies here. The present development of the electric industry in the United Kingdom owes its growth largely to him. 'Largely' is a small word to express how much we owe to him. I do not wish to enter into any comparisons or superlatives, but I do not think any man in the world of engineering could be named to whom more is due than to Mr. Westinghouse for his work in electric engineering. Other things besides mechanical engineering and electrical engineering we owe to Mr. Westinghouse. We owe to him the bringing to England and causing to be appreciated in England, American methods—in a certain way which I may refer to without invidious comparison; American methods of industry, and resolution and determination—which are also English methods, because they have been inherited from England. (Applause). Here it comes back to us, with compound interest, in the shape of Mr. Westinghouse, and I am sure that we all feel that we are largely indebted—to him for what he has done for us, what he is doing for us, and in advance, for what he is planning to do for us in the future.

"We appreciate all this, and we appreciate him as a kind friend, a genial host and entertainer. I ask you to join me in drinking the health of Mr. George Westinghouse."

The toast having been honored with enthusiasm, Mr. Westinghouse rose to respond. Mr. Westinghouse's speech was especially interesting. He said:

"I wish to thank our distinguished scientific friend Lord Kelvin for the complimentary language he has used about me. And I would like to say to all you railway men here present, that my life has been very much associated with your calling. I invented the brake, of which Lord Kelvin has spoken, when I was scarcely twenty-one years old, and thus became acquainted with railway men when the railway industry was rather a poor one compared with what it is today. Since then I have closely followed railway operations, becoming acquainted with almost everything that is being done in them, and it is particularly my friendship with railway men which has prompted me to go forward in my work with an interest and keenness that probably would not have resulted from ordinary commercial motives.

"Lord Kelvin has been good enough to refer to my coming to this country. I came here thirty years ago, and for ten years or so I was here about half the time. At that time it was very difficult to get any new thing done in England. I often wanted to sit down and cry, because I could not get anyone to believe in anything (laughter). I wanted in those early days to try an iron brake shoe, because, on account of rapid wear we couldn't keep the wooden one adjusted. I had to beg and beg to be permitted to put a set of metal brake shoes on one tender on the Caledonian railway. Finally, I succeeded. You all know, that now-a-days all the railway shoes or blocks are made of cast-iron or other metal and are used upon all the wheels of the train.

"Lord Kelvin has alluded to 'American Methods.' May I say that one of your English difficulties is inherent, I think, in an old-world highly developed country. After a man (or a nation) has worked prosperously for a long time, he opposes improvement or suggestion, thinking: 'What I have is good enough—I won't try a new thing.' In America, however, the necessities have produced different results. Lord Kelvin speaks of England having sent many men to America. It has also sent to us many ideas. If you take up the American patent records, and follow the cases in litigation especially, you will find that among the references cited many are of English origin, some of them containing ideas so complete, the wonder is that the inventions disclosed were not established fully and completely in your own land. These records seem to show that Americans and Englishmen have invented the same thing many times.

"In America, however, we have always been short-handed with regard to labor. We have been obliged to find methods whereby one man may accomplish the work of two or three men as compared with your practice here. We have had the

best men from Europe; Englishmen, Germans, French, everybody—skilled men, highly trained men, as well as laboring men; we have combined tneir experience with our own, coupled it with our necessities, and have thus accomplished results unattainable in a country like this where you have more labor than you can well keep employed.

"As an illustration of what has been accomplished by the use of electricity in a great industry, I may cite the Homestead mills of the Carnegie company. Mr. Schwab, whose name is well known to you, is a genius in his way, particularly in the management of men, he is a master in organizing and directing men. Mr. Carnegie believed in him, and if Mr. Schwab made a suggestion in regard to the use of new appliances, even if it involved the tearing down of an old mill and putting up a new one, the new one was ordered. What Mr. Schwab thought should be done, was done. As a result of such progressiveness we may see the splendid mills at Homestead where they produce with about 4,000 men three times as much steel as the Krupp works produce with 15,000 men. The results are simply wonderful. You can start there today, in a building containing steel-melting furnaces, and you will there see three men mounted on a car with the charging apparatus which is moved and operated by electricity. With a few movements of this ingenious contrivance three men charge twenty furnaces, which prior to the use of electricity, would have required the labor of over 200 men.

"You may go into the yard of the Homestead mills where they pile the metal in stock. This yard is covered by a system of overhead cranes, and the result is that not only here, but in the mill, and in every other place, you may see great weights lifted and many undertakings going on without a single man exerting himself a bit—working not half as hard as I am working now. (Laughter).

"I took some English friends to Homestead. Mr. Schwab. after guiding us through several departments, said: 'I will now show you where we turn out 750 tons of plate girders per day.' The mill was in the shape of an 'L.' We went into the short end of the 'L' where the furnaces were fed by natural gas, of course requiring no stokers. The end at which we entered had a rather low roof, and there was in sight a contrivance like a battering ram in front of the furnaces; two workmen were sitting down eating their dinners near by; no one else was present. I thought: 'Mr. Schwab has made a mistake, he has asked us to see a mill that is not in operation.' But we went through the mill, which was about 200 ft. long; and suddenly we heard a rattle and then saw a truck approaching loaded with a big ingot. No one touched the truck or the ingot. The load came to a platform, the crane overhead dropped a pair of tongs and quickly put the ingot on the roller table, and as it moved along to the great rolls, it was automatically kept in place. The adjusting screws of the rolls were turned by little electric motors, and not a man in that house did a bit of work. It was just as easy as what you are doing now—looking on! (Laughter). We went back to the furnaces. There was a fifteen year old boy seated in a little place called the 'pulpit.' He was able, merely by the movement of levers, to open at will any of the furnace doors and move the car along. And we saw this car come in front of a furnace and the charging machine approach, and take out of the open furnace a hot ingot which was dropped on the car and moved off to its work. There was this boy doing absolutely no hard work, and his mill was turning out 750 tons of steel plate each day. My English friends said: 'England has no chance in competition with such methods.'

"Now all this sort of thing came about in America because of our necessities. We hadn't men enough to do our work. There was a premium in favor of those who could invent machines to work and thus supply the deficiency. At the Carnegie mills we went to see three blast furnaces. They were making 1800 tons of pig-iron in twenty-four hours. We saw only two or three men on a truck which was moved automatically. These men were letting the ore run from shoots and mixing it in the required quantity, and when they had filled a truck, it was carried up and its contents dumped into a furnace whence it returned for another load. They were running the metal into an immense receptacle into which the metal from all three furnaces was mixed. From this place the metal was taken as required, put into a special tank, mounted on a car and taken to Homestead, two or three miles away, to be poured into the furnaces; one heating only was required.

"I refer to all this simply to illustrate the immense advantages we have had in America, and the kind of experience I have been able to bring to this country and to which Lord Kelvin so generously alluded, and which I hope will be not only useful and profitable, but will establish for the company I represent a name and a position which you will all regard as most satisfactory. (Applause).

"I want to thank you very sincerely for the kind expressions with which you have greeted me, and especially for your acceptance of my invitation to inspect this evening a couple of inventions: one of which—the Hewitt Mercury vapor lamp—is a complete and accomplished thing. The rays of this light are not very pleasant as yet, but the light is likely, however, to be of great value. The other invention—the Hewitt static convertor—is quite new, and its object is to convert alternating currents into direct current at so low a cost in comparison with the sums which have heretofore been expended for equivalent results, that it is likely, when fully perfected, to cause an immense stimulus in regard to the use of electricity in all parts of England and particularly in the agricultural parts of the country, for farm work, and for moving all kinds of vehicles. I have taken advantage of these inventions to invite you to see them as my guests, and I thank you for having honored me with your presence to-night."

PERSONNEL OF THE MORGAN SHIPPING COMBINE.

Announcement has been made of the personnel and assignment of the reorganized heads and staffs of the various steamship companies included in the International Mercantile Marine Co. The list is as follows:

Corporate organizations of the International Mercantile Marine Co.:

President, Clement A. Griscom; vice-president in Great Britain, Sir Clinton E. Dawkins, K. C. B.; vice-president in America, Philip A. S. Franklin; treasurer, James S. Swartz; assistant treasurer, James F. Fahnestock, Jr.; secretary, Emerson E. Parvin; assistant secretary, James J. Hope; assistant to the president and manager, insurance department, Rodman E. Griscom; comptroller, Monroe W. Tingley; general counsel, Francis Lynde Stetson.

White Star Line.—Organization for conducting business: Chairman and managing director, J. Bruce Ismay, Liverpool; general manager, Harold A. Sanderson, Liverpool; assistant manager, American trade, Henry Concanon, Liverpool; assistant manager, Colonial trade, Lionel Fletcher, Liverpool; freight manager, Joshua Whiting, Liverpool; saloon manager, A. B. Cauty, Liverpool; second and third class manager, J. W. Thompson, Liverpool; general agent, United States, John Lee, New York; cabin passenger agent, New York, D. D. Wiepert; second cabin passenger agent, New York, J. B. A. Hostage; steerage passenger agent, S. S. Cortis.

American and Red Star Lines.—Organization for conducting business: General manager, Clement A. Griscom, Jr., New York; manager freight department, Samuel Bettle, New York; manager passenger department, James A. Wright, New York (specially charged with the management of first cabin and second cabin business); assistant manager passenger department, Augustus S. Anderson, Philadelphia (specially charged with the management of third class business); manager American Line in Europe, Henry Wilding, Liverpool; assistant manager American Line in Europe, John E. Willett, Liverpool; assistant manager American Line in Europe, Philip E. Curry, Southampton; manager Red Star Line in Europe, Edward Strasser, Antwerp; manager Pacific coast, George H. Higbee, San Francisco; cabin passenger agent, New York, John M. Kirk; steerage passenger agent, New York, Arthur Lederer.

Atlantic Transport Line.—Organization for conducting business: President and general manager, Philip A. S. Franklin, New York; manager, New York, J. H. Thomas; manager, Philadelphia, P. F. Young; manager, Baltimore, J. C. Gorman; manager in Europe, Charles F. Torrey, London; passenger agent, New York, H. L. Mead.

Leyland Line.—Organization for conducting business: Chairman, Henry Wilding, Liverpool; managing director, Walter Glynn, Liverpool; general manager, H. B. Roper, Liverpool; manager, Boston, George Bray; agent, New Orleans, M. J. Sanders; manager and agent, Montreal, John Torrence; assistant manager, Montreal, James Thom; manager and agent, Quebec, W. Molsom MacPherson; Manager and agent, Portland, John Torrance, Jr.

Dominion Line.—Organization for conducting business: Chairman and managing director, Henry Wilding, Liverpool; manager, John E. Willett, Liverpool; manager, Boston, C. P. Jameson; manager, Montreal, John Torrance; manager, Quebec, W. Molsom MacPherson; manager, Portland, John Torrance, Jr.

Advisory committees in America.—Freight committee: Samuel Bettle, chairman, New York; A. C. Fetterolf, assistant to chairman, New York. Passenger committee: James A. Wright, chairman, New York; W. W. Jeffries, assistant to chairman, New York.

Freight agents of the several companies: Chicago, W. E. Lawrence, western freight agent; Chicago, W. G. Sickel, assistant western freight agent; Minneapolis, T. O. Martin, freight agent.

Passenger agents of the several companies: Boston, F. O. Houghton, cabin passenger agent; Boston R. H. Farley, steerage passenger agent; Philadelphia, George H. Stuart, Jr., passenger agent; Washington, David Lindsay, passenger agent; Toronto, C. A. Pipon, passenger agent, Ontario; Chicago, Francis C. Brown, western passenger agent; San Francisco, C. D. Taylor, passenger agent, Pacific coast; St. Louis, R. E. M. Bain, southwestern passenger agent.

Crawford & Reid, Tacoma, Wash., have secured a contract to build a tug for the port of Portland, Ore. She is to be used as a dredge tender and will cost about $34,000.

WORLD'S SHIP BUILDING DURING 1902.

Lloyd's statistics of ship building show that during 1902, exclusive of warships, 694 vessels of 1,427,558 gross tons (622 steamers of 1,378,206 tons and seventy-two sailing vessels of 49,352 tons) were launched in the United Kingdom. The warships launched at both government and private yards amounted to twenty-three of 94,140 tons displacement. The total output of the United Kingdom for the year has, therefore, been 717 vessels of 1,521,698 tons. The output of mercantile tonnage in the United Kingdom during 1902 stands third in order of magnitude in the records of Lloyd's register, having been exceeded only in 1900 and 1901. Compared with the returns for 1901 when the output of both mercantile and war tonnage reached the highest level the present figures show a reduction of 97,000 tons as regards merchant vessels and 117,000 tons as regards war vessels. It is a significant fact that 98 per cent. of the tonnage launched was of steel and that 96.7 per cent. is composed of steam tonnage.

Of the total output, 1,125,136 steam tons and 31,629 sailing tons, or 1,156,765 tons in all (81 per cent.) belong to ports in the United Kingdom. In this connection, it may be noted that the losses, etc., of United Kingdom vessels during twelve months are shown by Lloyd's Register wreck returns to average 275,000 tons (201,000 steam, 74,000 sail). Sales to foreign and colonial owners for the twelve months ended November, 1902, reached a total of 310,000 tons (271,000 steam, 39,000 sail). On the other hand, purchases from foreign and colonial owners during the same period amounted to 72,000 tons (55,000 steam, 17,000 sail). The sailing tonnage of the United Kingdom would thus appear to have decreased by about 55,000 tons, while the steam tonnage has increased by 708,000 tons. The net increase of United Kingdom tonnage during 1902 is therefore about 643,000 tons. This figure exceeds all similar estimates which have been published by Lloyd's Register in previous years. For the last three years the estimated net increases were as follow:—1899, 313,000 tons; 1900, 220,000 tons; 1901, 543,000 tons.

In 1902, over 18 per cent. of the total output has been built to the order of foreign and colonial ship owners, as compared with 23 per cent. in both 1901 and 1900, 19 per cent. in 1899, 22 per cent. in 1898, and 25 per cent. in 1897. As was also the case in 1899, 1900 and 1901, Germany has provided the largest amount of work for British ship builders, eighteen vessels of 54,658 tons (3.8 per cent. of the total output) having been built for that country. The British colonies follow with thirty-eight vessels of 40,966 tons. Next come Austria-Hungary with 37,905 tons and Greece with 30,237 tons.

The annual ship building statistics of Lloyd's Register during recent years have illustrated the steady tendency towards the construction of steamers of large tonnage. During the four years, 1892-5, on an average eight vessels exceeding 6,000 tons were launched per annum in the United Kingdom. In the following four years, 1896-9, the average rose to twenty-five. For the last three years, 1900-2, the average has been forty-one. Of vessels over 10,000 tons, only three were launched in the four years 1892-5; seventeen were launched during the four years 1896-9; and twenty-three have been launched during the three years 1900-2. The largest steamers which have been launched during 1902 are the following:

	Tons gross.		Tons gross.
Cedric	21,000	Ionic	12,232
Arabic	15,860	Corinthic	12,231
Carpathia	12,900	Mayflower	11,960

Four sailing vessels of over 3,000 tons have been launched in the United Kingdom during 1902, viz.:

	Tons gross.		Tons gross.
Alsterberg	3,276	Arrow	3,090
Urania	3,265	Eclipse	3,090

Of the principal ship building centers of the country, Glasgow takes the lead, showing an output of 325,251 tons. Then follow in order Newcastle (280,860 tons), Sunderland, (230,351 tons), Greenock (159,235 tons), Belfast (157,464 tons), Middlesbro' (108,230 tons), and Hartlepool (81,824 tons). In war ship tonnage the leading ports stand thus: Glasgow (29,400 tons), Chatham and Devonport (each 20,800 tons), Newcastle (10,240 tons), and Pembroke (9,800 tons).

The returns for the year under review include 118 steam trawlers and other fishing vessels; seventy-one dredges, barges, etc.; twenty-seven yachts; thirty-four tugs; twelve vessels intended to carry oil in bulk; three vessels (viz.—Emerald, Queen Alexandra and Tarantula), fitted with steam turbine motors; and other vessels designed for special service.

Of the vessels launched in the United Kingdom, 529 of 1,109,409 tons have been built under inspection of Lloyd with a view to classification in Lloyd's Register book.

As regards the movements of the ship building industry during the course of 1902, Lloyd's Register returns show that, at the opening of the year, irrespective of war ships, 1,359,205 tons (1,327,702 steam, 31,503 sail), were being built in the United Kingdom. The returns for the March quarter indicated a reduction of 119,000 tons in the work in hand. By the end of June a further reduction of 110,000 tons had occurred; and three months later work had fallen off still further to the extent of 129,000 tons. At the present time 1,024,067 tons (1,001,739 steam, 22,328 sail) are under construction. These figures are slightly in excess of those for the preceding quarter, but are less than those for December, 1901, by 335,000 tons, or more than 24 per cent. As compared with the work in hand in September, 1901, when the highest figures recorded in the history of the ship building industry were reached, the tonnage now under construction is less by 390,000 tons, or more than 27 per cent. It should be added that the amount of war ship tonnage under construction in the United Kingdom is now smaller than it has been since September, 1896. The highest total recorded by Lloyd's Register was reached in March, 1900, when 454,000 tons displacement were in hand. The total is now 300,690 tons.

It appears that there have been built abroad during the year, 487 steamers of 747,945 tons and 469 sailing vessels of 327,252 tons, in addition to eighty war vessels of 191,166 tons displacement. Among foreign countries, the three leading places are held by the United States of America (379,000 tons), Germany (214,000 tons), and France (192,000 tons).

Of the mercantile tonnage reported from the United States, a considerable proportion does not affect the general commerce of the world, being intended for service on the great lakes. As showing the size of vessels employed in that trade, it may be mentioned that sixteen steamers have been built for it during 1902 of upwards of 4,000 tons each, while seventeen others range between 3,000 and 4,000 tons. On the coast, twelve steamers of over 4,000 tons each, besides three steel and six wooden sailing vessels of over 2,000 tons each, have been launched. The largest steamers included in the returns are the Finland and Kroonland of 12,760 tons each, which have been built at Philadelphia under the survey of Lloyd's Register. At Quincy, Mass., has been launched the largest sailing vessel yet constructed, viz., the steel seven-masted schooner Thomas W. Lawson, 5,218 tons.

Germany has launched four steamers exceeding 8,000 tons each, the largest of which is the Kaiser Wilhelm II. of 20,000 tons, built at Stettin. Three steel sailing vessels exceeding 3,000 tons each are included in the output of Germany during the year, the largest being the five-masted ship Preussen, 5,081 tons, built at Geestemunde, under the survey of Lloyd's Register.

In France, although the construction of large steel sailing vessels seems now to be declining, fifty-four such vessels, of 2,000 tons and upwards, have been launched during the year under review. The largest of these are about 3,200 tons each, eight of this tonnage having been built. The steam tonnage launched in France during 1902 is rather less than in 1901; but there are now 77,000 tons under construction, as compared with 59,000 tons a year ago.

The total output of the world during 1902 (exclusive of war ships) appears to have been about 2,503,000 tons (2,126,000 steam, 377,000 sail). Lloyd's Register wreck returns show that the tonnage of all nationalities totally lost, broken up, etc., in the course of twelve months amounts to about 740,000 tons (362,000 steam, 378,000 sail). It will thus be seen that the total net increase of the world's mercantile tonnage during 1902 is about 1,763,000 tons. Sailing tonnage has been slightly reduced, while steam tonnage has increased by 1,764,000 tons.

Compared with the net increase for the world, the net increase of 643,000 tons, as stated above, for the United Kingdom is equivalent to over 36 per cent. In the net increase of the world's steam tonnage, viz., 1,764,000 tons, the United Kingdom has shared to the extent of 708,000 tons, or 40 per cent. Of the tonnage launched during 1902, the United Kingdom has acquired over 46 per cent.; and of the new steam tonnage the United Kingdom has acquired over 53 per cent.

NEW VESSELS IN JANUARY.

The bureau of navigation, treasury department, reports fifty-three vessels of 3,234 gross tons built in the United States and officially numbered during January. As indicated by the total tonnage there are no large vessels in the list. Steel vessels in the list are confined to five craft of a aggregate of only 588 tons built on the Atlantic coast. The great lakes are not represented in this January summary, but it is, of course, understood that January is not one of the months in which vessels are usually completed on the lakes. Of the new wooden vessels Atlantic coast yards turned out twenty-one sail of 1,720 tons and thirteen steam of 560 tons; the Pacific coast yards one sail of 9 tons and four steam of 122 tons; western river yards, seven steam of 220 tons. A new sailing vessel of 6 tons is reported from Porto Rico and a steam vessel of 9 tons from Hawaii.

It appears from a statistical statement published by the Japanese minister of communication that during the four years ended with 1901 the number of steamships in the Japanese merchant service had increased from 627 to 942, the number of sailing ships from 174 to 3,416, the tonnage of steamships from 429,774 to 557,166, and the tonnage of sailing ships from 24,014 to 315,576. In connection with these figures it is interesting to note that in 1896 Japan possessed only one merchant steamship of a tonnage exceeding 5,000 tons but now she possesses twenty-one steamers whose individual tonnage is above 5,000.

GREAT BRITAIN'S FOREIGN TRADE.

In 1902 Great Britain imports amounted to £528,860,284, a sum never before reached. The total announced is £6,870,086 in excess of the figures for 1901 and £5,785,121 over 1900. Of the imports £65,810,864 were re-exported, or £2.031,208 less than in 1901, but £2,628,926 more than in 1900, thus reducing the net bill for imports to £463,049,600. Exports amounted in value to £283,539,980, a gain as compared with 1901 of £3,517,-604 but a decrease compared with 1900 of £7,652,016. Great Britain's adverse trade balance of 1902 reaches the unparalleled sum of £179,509,620. In the following the details as reported by tne Board of Trade are given:

	1901.	1902.
Goods imported	£521,990,198	£528,860,284
Foreign and colonial mdse. exported.	67,841,892	65,810,684
British and Irish produce and manufactures exported	280,022,375	283,539,980

For the purpose of classification both imports and British and Irish exports are subdivided as follows:

	1901.	1902.
Animals, living, (for food)	£ 9,426,803	£ 8,269,175
Articles of food and drink, duty free.	97,675,609	101,452,142
Articles of food and drink, dutiable..	112,736,817	108,988,634
Tobacco, dutiable	4,745,888	5,799,810
Metals	30,788,008	30,361,902
Chemicals, dyestuffs and tanning substances	6,129,498	6,133,062
Oils	11,019,677	11,442,373
Raw materials for textile manufactures	79,286,268	78,570,555
Raw materials for sundry industries and manufactures	57,981,249	58,631,448
Manufactured articles	93,626,774	99,050,648
Miscellaneous articles	17,311,145	18,828,945
Parcel post	1,262,462	1,327,590
Total value	£521,990,198	£528,860,284

British and Irish Exports.

	1901.	1902.
Animals, living	£ 742,151	£ 824,361
Articles of food and drink	14,890,392	16,439,603
Raw materials	33,356,531	31,171,616
Articles manufactured and partly manufactured—Yarns and textile fabrics	103,458,637	103,336,862
Metals and articles manufactured therefrom (except machinery and ships	39,333,667	42,612,141
Machinery and mill work	17,812,344	18,751,812
Ships, new (not registered as British)	9,149,144	5,891,775
Apparel and articles of personal use..	10,907,872	12,130,371
Chemicals and chemical and medicinal preparations	8,955,514	9,586,728
All other articles either manufactured or partly manufactured	37,764,455	39,296,233
Parcel post	3,642,369	3,478,478
Total value	£280,022,376	£283,539,980

No such attempt at classification is made with regard to foreign and colonial merchandise exported, but they form the surplus of goods imported, and which are re-shipped in the same state as received. The figures for the principal articles are as follows:

	1901.	1902
Caoutchouc, cwt.	293,792	291,751
Coffee, cwt.	676,601	365,756
Cotton, raw, cwt.	1,844,348	2,456,822
Fish, cured or salted, cwt.	445,912	437,884
Hemp and tow, tons	64,398	45,689
Hides, dry and wet, cwt.	365,834	289,891
Jute, tons	121,965	122,700
Manufactures, value	£1,831,654	£1,587,914
Leather, cwt.	185,566	144,854
Metals and articles manufactured therefrom (principally copper and tin), value	£4,833,269	£4,403,868
Tea, pounds	43,389,518	45,489,588
Wool, sheep and lambs, pounds	293,062,982	283,770,603

Toward the filling up of the tremendous discrepancy shown between exports and imports the London Financial News reasons that there is applicable for that purpose £66,250,000 of interest and dividend payments upon foreign and colonial investments held in Great Britain, leaving about £113,250,000 to be made up by shipping freights and odds and ends, such as mercantile commissions earned in England upon commercial transactions in goods passing between countries over seas. Yet experts in the shipping trade say that four-fifths of the ships in the British mercantile fleet made no profits at all last year, but that many of them rather incurred actual losses, and that most of the ships in the remaining fifth made but small profits.

In further commenting on the returns the Financial News says: "It is an appalling conclusion—so appalling that we hesitate to draw it definitely without more precise knowledge than exists—that this country lived upon its capital last year to the extent of roughly £100,000,000. Even setting aside this nightmare figure, as being surely susceptible to some modification, it does not seem possible to avoid the conclusion that we have to some extent been drawing upon our capital during the past year. The figures of a good many previous years have pointed to the same conclusion in respect to them. The records of the return of American railway scrip to the United States, and of the smaller amount of foreign bonds handled in London than in former years; the contraction of stock exchange business; the difficulty of raising money for new enterprises, even at times when money is, technically, cheap and plentiful; the disappointing exhibit made in wills of men supposed in life to have been much more wealthy than the probate figures gave credit for—all these things, in greater or less degree, confirm the grave lessen taught by the trade figures we have quoted. The nonsense which has been talked about our unexampled prosperity and progress has become dangerous nonsense, and the nation needs to be awakened to a more serious mind.

"Turning now to the details of the trade returns, we find in the export summaries that the biggest change, compared with the previous year, is an increase of £3,278,474 under the head of 'Metals and Articles Manufactured Therefrom (except Machinery and Ships).' Had ships been included there would have been no increase at all worth naming, for our export of them is down by £3,257,669, though had machinery and mill work been also included there would have been a rise—of £939,468—from the inclusion. It is unfortunate that the gain in metal, etc., exports should have been so nearly balanced by the decline in ships, because a ship is a fully manufactured article, representing the working up of a great and various assortment of raw materials, and the entire process of conversion from the rudimentary to the final forms employs home labor. This is not the case with many of the articles grouped under the heading of metals, etc. For instance, toward the increase under this heading pig iron contributes no less than £939,369 and pig iron represents an export in its crudest form short of an export of ore itself. The increase—it is in quantity from 839,182 tons to 1,102,835 tons—is, it is interesting to note, as nearly as possible equal in amount to the increase in production (estimated by Messrs. Bolling and Lowe at 250,000 tons) during the year. There would, however, have been no increased export but for the fact that the United States took £1,524,587 worth more than in 1901; and the American market has been a 'chance' market, which must quickly disappear, either by the contraction of the unprecedented demand of American manufacturers or by the expansion of American furnaces to cope with that demand. We would not, however, draw a gloomier view than is necessary, and we will therefore note the fact tnat many departments of iron and steel manufacture do, in respect to exports, show an expansion last year; railroad iron, for example, (which mainly consists of steel rails), is up in value by £524,375; the quantity exported was 717,021 tons last year, comparing with 572,724 tons in 1901 and with 463,731 tons in 1900.

"Among the imports the biggest change during the year appears under the head—a vague head, in a way, but very significant—of 'Manufactured Articles'; the amount of the increase is £5,423,874. The total value of these imports was £99,050,648. Needless to say, there is not one of all the articles in this division which might not have been produced in this country—the old-time 'world's workshop'; and at least the great majority would have been so produced, and produced as well, and in some cases better—to the greater employment of British capital and labor—had the government given sufficient discouragement to the import. To take a few instances: Could not Birmingham (where complaints of slack trade have been frequent throughout the year) have made the £1,368,534 worth of hardware (other than cutlery) which we imported? And that figure compares with £1,117,277 in 1901 and with £880,627 in 1900. Was it necessary to purchase from abroad (largely from America, which shuts out our goods) $8,096,637 worth of leather? Have our glove makers so lost their cunning that we needed to buy £1,719,594 worth of foreign goods? And is it not pitiful, when we remember Coventry and Spitalfields, to see that we bought foreign silk manufactures last year to the value of £13,416,540? So we might go on enumerating the instances which confound the old boast that the world could not touch us in manufactures, and the old argument that our dependence upon foreign food was for the purpose of maintaining our manufacturing supremacy; but we will, at all costs, finish this first trade article of the new year upon a cheerful note; we will record with satisfaction a decrease in the value of our import of electrical goods and apparatus from £1,265,946 in 1900 to £849,257 in 1901 and to £684,974 in 1902. It is not much, particularly as diminished construction is as likely to explain the decrease as increased home manufacture; but these are days when Englishmen must be content with small triumphs."

Homeseekers' and Colonists' excursions to the west, northwest and southwest by way of the Nickel Plate road on the first and third Tuesdays of February, March and April, 1903. For low rates and particulars see nearest agent. E. A. Akers, C. P. & T. A., Cleveland, O. 285, Mar. 1.

LAKE FREIGHT MATTERS.

The impression has gone out that officials of the United States Steel Corporation who have to do with iron mining and transportation interests on the lakes are inclined to favor somewhat higher freight rates than were paid on season contracts last year. No definite reason is given for this opinion. It is simply the outcome of talks of a general kind on the subject of freights with officials of the big organization. Some increase in the cost of operating the vessels, especially as regards fuel and labor, seems certain, and it is not probable that handling charges will be reduced. Even if the plans of the producers of iron ore should not contemplate an increase in the output, it is more than probable that the movement of coal will greatly exceed all previous records, and the prospects as to grain, especially corn out of Chicago, are very encouraging. In view of these conditions and the announced intention of the ore dealers to ask for higher prices on ore it is reasonable that the vessel owners should expect an advance over last year in freights. The Steel Corporation can, of course, engage vessel capacity for another year in advance of prices on ore being fixed by the so-called independent interests, as there is no reason on their part for delay on that score, and if they should offer any advance over the 1902 rates they would very probably get vessels at once, but as yet no definite negotiations have been undertaken—simply talk of what the rates should be.

The ore dealers, who have held a couple of preliminary meetings in Cleveland, have practically decided that prices of ore—the Bessemers—should be higher than last year. They have not had anything like their share of profits as compared with what has been earned in pig iron and in manufactured lines. It is expected that the advance will be conservative. It is not as yet determined whether there will be any agreement as to non-Bessemer ores. The Steel Corporation will probably be out of the market as a seller of ore during the coming season, especially if the advance contemplated by the association is moderate. The schedule of ore prices is likely to be agreed upon within the coming week.

PROBABLY MEANS PACKAGE FREIGHT MERGER.

It is generally believed that the recent sale of the Northern Steamship Co.'s fleet of steel package freight steamers to a syndicate representing the Erie, the New York Central, the Lackawanna, the Lehigh Valley and the Pennsylvania railroads, is the first step towards a general merger of the leading package freight lines of the lakes, that have for years been operating between Duluth, Chicago and Buffalo. This is not said with any inside knowledge of matters connected with the sale of these steamers. It is simply the opinion of vessel men who have a knowledge of conditions surrounding the operation on the lakes of ships controlled by the railways. Of course there is an arrangement with the syndicate taking the vessels for the care of Great Northern freight on the lakes.

The Northern Steamship Co. was created by James J. Hill and it was one of the enterprises from which he achieved success in the transportation world. The vessels were operated in conjunction with the Great Northern Railway and since the acquisition of the Burlington by the Hill interests with that system also. Until the acquisition of the Burlington by the Hill interests the vessels were the only eastern outlet the Great Northern road had exclusively under the control of Mr. Hill. The fleet consists of six steel steamers each 299.5 ft. long, 40.8 ft. beam and 21.6 ft. deep. They were built by the Globe Iron Works Co. in Cleveland, three of the steamers, Northern King, Northern Light and Northern Queen, in 1888, and the other three members of the fleet, the Northern Wave, North Star and North Wind, in 1889. The Great Northern elevator in Buffalo harbor, which is included in the deal, has a storage capacity of 1,250,000 bushels of grain.

The two passenger steamers, North West and North Land, are not included in the deal. Last year these vessels ran between Chicago and Buffalo, but the company is contemplating restoring them to the Duluth route. Announcement regarding their assignment will be made shortly.

LAKE CARRIERS' REORGANIZATION.

Another meeting of the reorganization committee of the Lake Carriers' Association will probably be held in Cleveland in a few days for the purpose of making some changes in the plans of reorganization that will bring in large vessel interests not yet fully committed to the new order of things. The cooperation of the Steel Corporation is assured following the action of this meeting. The changes proposed are not important as they relate to the general membership of the association. Mr. J. C. Gilchrist is still undecided as to the position he will take regarding his large fleet of vessels, but with all other interests represented in the new body it is more than probable that his vessels will eventually be enrolled. It is quite likely that the meeting of the reorganization committee to put the plan fully into operation will not be held for at least two weeks, and the election of directors and officers, dealings with labor organizations, etc., must await this meeting. Most of the vessel men feel that no great hurry is needed on this score, as they think they should have some knowledge of freights, handling charges, etc., before undertaking obligations regarding the operation of their vessels. Of course a general attendance of the members of the association will not be required in fixing up the final details of organization. The committee is steadily obtaining proxies and will act for the entire association in electing the board of directors, which will in turn elect the officers. The question of dues has not yet been settled but they will not likely vary much from those of last year.

ANOTHER CANADIAN VESSEL COMPANY.

The Inland Lakes Transportation Co. is a Canadian corporation, recently organized to own and operate vessels that are to engage principally in the grain trade between Port Arthur and Collingwood. It is also expected, of course, that the vessels will carry grain and other freight from such ports as Duluth and Chicago to Georgian bay ports. The company's plan is to first bring to the lakes, early next spring if possible, three steamers that were built in England for Black sea trade and which can be delivered on the lakes at a total cost to stockholders, according to the prospectus of the company, for $450,000, this including the expense of cutting them in two for passage through the St. Lawrence canals. The vessels are each 312x44 x27 ft., with capacity for 140,000 bu. of wheat on 18 ft. draught. They have triple-expansion engines of 22 in. high pressure cylinder, with boilers allowed 180 lbs. steam pressure. The vessels are said to be practically new and the price above noted is therefore very low, in view of prices now prevailing on the lakes and in view also of the crowded condition of lake ship yards. Officers of the company are: James W. Curry, K. C., of Toronto, president; Michael Strauss, grain exporter of Chicago, vice-president; F. D. Clisdell, vice-president of the People's Coal Co., Toronto, secretary and treasurer; J. J. Daley of Chicago, manager. Mr. Daly, who is active in securing funds for carrying out plans of the company, is known to vessel men of Chicago on account of his connection with the Rogers-Bacon Grain Co. of that city.

D. & C. CO. DECLARES A STOCK DIVIDEND.

The annual meeting of the Detroit & Cleveland Navigation Co. was held at Detroit Tuesday. The principal business transacted was the increasing of the capital stock of the company from $1,500,000 to $2,000,000, a stock dividend of 33 1/3 per cent. being declared. The capitalization was increased to take up a part of the $535,000 surplus. There still remains in the treasury a surplus of over $135,000. Speaking of this action, President McMillan said: "The stock dividend plan was unanimously adopted by the stockholders and was adopted in order to enable the stockholders to participate in the prosperity of the line for the past five or six years. This is giving the stockholders what justly belongs to them. We are spending a good deal of money on the boats of the line. There will be no new boats at the present time. The cabins of the steamers City of Cleveland and City of Detroit are being remodeled and will be handsomely fitted up. When completed in the spring they will compare favorably with anything on the lakes."

Statements concerning the financial condition of the Detroit & Buffalo Steamboat Co. show that after paying all operating expenses, fixed charges and interest, there is still a balance of $4,000 in the treasury. For the first season this is considered a good showing.

Officers elected were: Detroit & Cleveland Line—W. C. McMillan, president and general manager; Hugh McMillan, treasurer; Philip H. McMillan, secretary; James McGregor, vice-president; B. C. Wilder, assistant treasurer; George M.

Black, accountant; directors, above and George Hendrie and A. A. Shantz.

Detroit & Buffalo Line—George Hendrie, president; W. C. McMillan, treasurer and general manager; Thomas F. Newman, vice-president; B. C. Wilder, secretary; George M. Black, accountant; directors above and D. C. McIntyre, F. S. Masten, C. Morris, A. C. Angell and A. A. Schantz.

AROUND THE GREAT LAKES.

At the annual meeting of the Licensed Tugmen's Protective Association at Milwaukee last week it was voted to increase the salary of President McCarle $500 per year.

The new State street rolling-lift bridge at Chicago will be opened to the public on Mar. 1 according to Chief Engineer Randolph of the Sanitary district of Chicago.

The annual meeting of the Cleveland & Buffalo Transit Co. was held at Rockport this week but there were not enough stockholders present to do business. The old directors will therefore hold over for another year.

Representative Mann of Illinois has introduced a bill in the house of representatives at Washington for the construction of a waterway from the Calumet river to the sanitary canal in Illinois, the cost to the United States not to exceed $5,000,000.

The steamer Pleasure, which left Detroit for Port Huron to assist the ice crushers there, was fifty-two hours making the trip. She was repeatedly delayed by fog, snow and darkness. Her average speed, while actually running, was 3 miles an hour.

The Tug Linemen & Firemen's Association of the great lakes whic.. neld a ten days' convention at Milwaukee has adjourned after electing officers as follows: President, Archie Valiquet, Chicago; secretary, John Bourke, Sault Ste. Marie; treasurer, John Beyer, Cleveland.

Mr. W. C. Farrington of the Northern Steamship Co. who is shortly to leave Buffalo to take charge of the South Pacific's Atlantic line of steamers with headquarters at New Orleans, was presented with the finest obtainable marine glass by the captains and engineers of the Northern Steamship Co. last week.

President E. N. Saunders of the Northwestern Fuel Co. announces that his company intends to shortly begin the construction of a very large coal dock at Ashland. The dock is to be equipped with automatic machinery of the latest kind and it is said the storage capacity will be greater than that of any dock on the lakes.

It is quite evident from the early start of engineers aboard vessels of the Steel Corporation that the management of the big organization intends to again operate its fleet to the fullest capacity, beginning as early as possible, during the coming season. Most of the engineers are already getting their machinery in shape for the opening.

Hereafter the Republic mine, one of the oldest of the Lake Superior properties, will be handled in the offices of M. A. Hanna & Co., Cleveland. The Republic Iron Co., which sold its mining lands and vessels to the Cambria Steel Co., has ceased its individual existence. The Republic shipped last year 157,616 tons of ore and has shipped altogether 5,172,501 tons.

It is expected that a small steel vessel for river service in Texas will be built at the works of the Manitowoc Dry Dock Co. The wooden passenger steamer, 140 ft. long, building at the Manitowoc works for Mr. Cartier of Ashland, Wis., is well along towards completion. The fore-and-aft compound engine to be installed in this vessel is being built by the Montague Iron Works.

An Ottawa dispatch says that letters patent of incorporation have been issued to the Western Steamship Co. Ltd., with a capital stock of $100,000. The incorporators are John Arnold McKee, Toronto; Robert James McKee, Buffalo; William J. Bassett, Collinwood; Charles Smith and James William Bain of Toronto. The purpose of the company is to carry on a general steamship business in Canada.

At the annual meeting of the Inland Lloyd's, held at Buffalo last week, President Gadsden and Secretary and Treasurer McDonell were re-elected. There are many losses yet waiting for adjustment but it was the opinion of the agents that there were no net earnings on cargoes and very little on hulls. The subject of rates was not taken up but probably will be at a meeting to be held later for that purpose.

Capt. Wiley M. Egan, one of the oldest and best known vessel owners of the lakes, is dangerously ill at his home in Chicago. Recovery is not expected. Capt. Egan became master of lake vessels when not much more than a boy and for over thirty-five years has been one of the most prominent vesselmen in Chicago. He served with distinction in the Illinois state senate and was president of the Chicago board of trade.

Thomas Meyer, who has been general manager of the Union Transit Co., Buffalo, for some time, has resigned. His place has been taken by Henry C. French, Jr., a son of Henry C. French, president of the company. Mr. French, Jr., has been filling the position of secretary and treasurer of the company. His brother, T. B. French, will now take his place and a third son of Mr. French, W. B. French, will take a place in the office of the company.

The Buffalo Dredging Co. has secured the contract for improving the channel between Bird Island pier and the mainland generally known as Black Rock harbor in Buffalo. The company's bid was $802,250, which was just within the appropriation. The plans call for excavation of a main channel 400 ft. wide, 3,000 ft. long and 23 ft. deep, beginning at the entrance to Buffalo harbor and extending into the Erie basin and beyond. It will probably take about four years to complete.

The new steel steamer James S. Keefe, the first of ten vessels being built for the Great Lakes & St. Lawrence Transportation Co., was successfully launched at the Buffalo yards of the American Ship Building Co. last Saturday. The Keefe is 255 ft. over all, 241 ft. keel, 41 ft. beam and 18 ft deep She will be equipped with triple-expansion engines with cylinders 15, 25 and 42 in. in diameter with stroke of 30 in. Steam will be supplied by two Scotch boilers, 11 ft. in diameter and 11 ft. long.

At the annual meeting of the Goodrich Transportation Co. of Chicago, the following officers were elected: President, A. W. Goodrich, Chicago; vice-president, R. L. Upton, Chicago; treasurer, W. J. Lauderbach, Chicago; secretary, F. C. Reynolds, Milwaukee; assistant secretary, P. W. Thorp, Chicago; superintendent, D. H. Cochrane, Milwaukee. The officers and Lawrence A. Young of Chicago comprise the board of directors. Mr. Young was elected to the directorate in place of Frank O. Lowden of Chicago.

Representatives of the tugmen of the lakes will shortly take up with officials of the Great Lakes Towing Co. the matter of wages and other agreements relating to the operation of tugs during the coming year, this in accordance with the understanding that was reached when the prolonged strike of tugmen was settled some time ago. It is expected on both sides that there will be little difficulty in agreeing upon a contract that will cover the business for the coming year. The conference will probably be held in Cleveland.

The branch hydrographic office at Duluth reports that a coal dock has been established at a village called Keweenaw bay, a station of the Duluth, South Shore & Atlantic railway on the west shore of Keweenaw bay. The dock is 1,000 ft. long and extends nearly due east and west. The lake bottom is a gradual run from the shore line to the outer end of the dock where there is a depth of 18 ft. of water. The lights visible on approaching the dock are Sand point light, off Baraga, and Portage entry light, off Jacobsville. The plant is lighted within and without with electric lights which can be seen after making Point Abbaye.

It is reported from Detroit that Maj. W. H. Bixby, United States engineer in charge of the large channel improvements in connecting waterways of the lakes, is to endeavor during the coming season to gather the statistics of the commerce passing through the St. Clair flats canal and past Detroit. These statistics would be extremely valuable if they could be secured but all attempts hitherto to secure them have failed. The only accurate statistics of lake commerce are those which are kept at Sault Ste. Marie by the government officials, but these, of course, only measure the commerce of Lake Superior. It is Maj. Bixby's purpose to detail a man at Detroit and at the St. Clair ship canal to gather the figures.

Mr. D. J. Keefe, president of the International Longshoremen, Marine & Transport Workers' Association, was in Cleveland during the present week making arrangements for the joint conference of the dock managers and the representatives of the ore and coal handlers at Lake Erie ports. The joint meeting will be called on Mar. 10, so that the delegates from the different locals will be in session before that time. Mr. Keefe said that the men are going to make no unreasonable demands. There is, of course, no date for the meeting between the Lake Carriers' Association and the Longshoremen's Association. However there is no especial hurry for this conference, as everyone will know more about the outlook for 1903 a month from now than he knows at present.

Judge Street of Toronto has given a decision holding that charters for international ferry systems in which the Ontario government is interested must be obtained from the Ontario government and not the dominion government, as has been the custom for many years. When the ferry line was established at the Canadian Sault the Ontario government claimed the right to grant the charter for the steamer Fortune to go into commission on the ferry line. The dominion government claimed that it had the sole right in matters pertaining to licenses for international ferries and it was decided to make a test case of the matter. In giving his interpretation of the statutes bearing on the case at issue, Judge Street held that the provinces had the right to deal with such matters before confederation and that he could find nothing in the British-North America act which annulled the right of the provinces.

The Chicago & North-Western is the only double track railway between Chicago and the Missouri river. tf.

SKETCH OF CAPT. RICHARD W. ENGLAND.

One of the Detroit newspapers publishes an interesting little sketch of Richard W. England, captain and part owner of the steel steamer G. J. Grammer. From watchman on a river passenger steamer to master and part owner of the Grammer is his unusual record. "When Capt. England," says the newspaper, "shipped as watchman on the steamer City of Toledo in 1889 the outlook for the future appeared no brighter than to many other youth who seeks a life before the mast, but an element of luck entered into the Detroiter's career, and this, coupled with keen business ability, has paved the way for him to become a factor in the business of the great lakes. In 1893 Capt. England became mate of the steamer Gov. Smith, of the Ogdensburg Transit Co., shipping on the first trip the vessel made after coming from her builders. He remained with her three years, and then became mate of the Anchor Line steamer Japan, sailing on her four years. It was while in her that Capt. England met Frank Seither, a wealthy manufacturer of Cleveland, who was a passenger on the Japan and struck up a conversation with young England. The talk drifted to the chances for a young man to make money on the lakes.

"'There's nothing in it for a young man,' said England.

"'Why not?' asked the Cleveland man.

"'Because the Rockefellers and the rest have gobbled up about everything. Look there, and there; do you see all those Steel Trust boats passing us?' (Which shows that Capt. England is gifted with most prophetic vision for the Steel Trust, so-called, was not formed until 1900. But, of course, Capt. England did not say that. Newspapers, like poets, are allowed great license when dealing with facts.)

"Mr. Seither allowed that he saw, and then began to argue that there was room for more, with the result that a proposition was made to buy a steamer, he to supply the necessary cash. The V. H. Ketcham was purchased for $20,000, and the youthful England became her master. He was given an interest and carte blanche in her management. So well did he succeed that the Ketcham paid for herself in two seasons and in the fall of 1901 the steamer George J. Grammer was contracted for. She came out last spring with Capt. England in command, and he will sail her again next season. The Ketcham is still managed by Capt. England, and he also looks after charters for the Grammer. The company owning the two steamers is known as the Seither Transit Co., with Mr. Seither and the Detroit captain as its stockholders. The Grammer is 365 ft. in length, 48 ft. beam and 28 ft. deep. It was Capt. England who last fall rescued the nine men of the steamer C. B. Lockwood, which foundered off Fairport. He was on his way to Ashtabula with ore at the time. A heavy sea was running and the men were saved with difficulty. On the return trip he found the empty yawl which had contained the ten men who were lost. Capt. England was married about a month ago and resides with his wife at 76 Rosedale court, Detroit."

SAULT STE. MARIE CANALS.

The legislature of the state of Michigan has appropriated $15,000 with which to commemorate the construction of the first ship canal at Sault Ste. Marie, Mich. The Lake Carriers' Association at their annual meeting in Detroit recently adopted a resolution commending the proposed celebration and calling upon the lake representatives and senators to support the necessary legislation to provide for federal participation in the event. President Livingstone was instructed to appoint a special committee to further legislation in behalf of the celebration. Ground was broken for this canal on June 5, 1853, so that on June 4, next, the semi-centennial anniversary will occur. The following information regarding the American canals at Sault Ste. Marie is contained in the latest annual report of the chief of engineers of the war department:

"Commercial navigation of the falls of St. Mary's river at Sault Ste. Marie was impracticable until 1855 when the state of Michigan constructed a canal and double lock, which proved a convenient navigable channel for vessels whose draught did not exceed 11.5 ft. (12 ft. in 1870) at mean stage of water. This improvement was completed in 1855, the double lock having chambers of 350 ft. length and 70 ft. width, with gate openings 70 ft. width, arranged for 9-ft. average lift at each lock, and the canal being about 5,400 ft. long with an available width of 70 ft. and a top width of 100 ft. The commerce was, in 1870, about 700,000 tons per annum.

"In 1870 the United States entered upon a project for increasing the canal to at least 100 ft. width building a new lock and providing for 100-ft. draught. The new lock (now known as the Weitzel lock) was opened to traffic in 1881, its single chamber being 515 ft. length and 80 ft. width, with gate openings of 60 ft. width, arrange for 18-ft. average lift. The cost of the work from 1856 to 1885, inclusive, was $2,875,692, including $10,000 diverted from the 1864 great lakes appropriation. A rapidly increasing commerce developed as a result of these improvements.

"The present project, presented in reports dated Oct. 8 and Dec. 22, 1886, and which provided for building a new single-lift lock on the site of the old state lock, with a chamber of 800 ft. length and 100 ft. width and 21 ft. of water over miter sills, and with gate openings of 100 ft. with arranged for a lift of from 16 to 21 ft., the canal, together with its approaches, to be deepened to correspond, all at an estimated cost of $4,738,865, was started by the river and harbor act of Aug. 5, 1886, and adopted by that of Aug. 11, 1888, and work was commenced under the approval of the war department as given on Oct. 28, 1886. The essential features of the project were so far completed in 1896 as to permit the new lock to be opened to navigation Aug. 3 of that year, this lock being now known as the Poe lock. Work since that time has consisted in completing the deepening of the canal and its approaches, rebuilding and extending piers and grading and improving canal grounds. The total expenditure to June 30, 1902, was $3,996,948.25."

GREAT FUTURE FOR BUFFALO PREDICTED.

Mr. Frank H. Goodyear and Charles W. Goodyear of Buffalo recently gave a dinner at the Buffalo Club at which it was estimated that the vested interests present represented $500,000,000. Brief after-dinner speeches were made. Mr. William A. Rogers, who is president of the new Buffalo & Susquehanna Iron Co., spoke of Buffalo's future as an iron and steel center. Mr. Rogers is also senior member of the firm of Rogers, Brown & Co. In the course of his remarks Mr. Rogers assured his hearers that the opportunities for the development of the iron and steel business in the vicinity of Buffalo are limitless. He said that at no other point in the world of which he had any knowledge, were there more or better facilities for the economical production of iron and steel. He pointed to the fact that fuel and raw material can be assembled cheaper there than at any other point; that the transportation facilities are superb; that within easy reach of the city is a vast, thickly populated wealthy and progressive territory constituting the best market in the world and that cheap power is also obtainable. Mr. Rogers said that it was inevitable that Buffalo should become the great steel producing city of the world and that within a comparatively brief period of time the Niagara frontier from Stony Point to Niagara Falls would be one great industrial center and that covering all this territory there would be one great, compact city of vast population and unreckonable wealth.

NEW CANADIAN CANAL.

It is announced that under a charter, amended and re-enacted at the last session of the Dominion parliament, work is to begin in the spring on a canal connecting the Richelieu river at St. John's with the St. Lawrence opposite the city of Montreal. It is to be pushed vigorously and will be completed within two years as it is a short cut and involves the investment of about $5,250,000. The charter provides that the canal shall have a depth of not less than 9 ft. and a width of not less than 80 ft. at the bottom. As a matter of fact, it will have immediately a depth of 14 ft, corresponding with that of the St. Lawrence canals. Its length is 18¼ miles. The present connection between Lake Champlain and the St. Lawrence is by the Richelieu river, which is its outlet, and the Chambly canal, the oldest of the Canadian artificial waterways.

The Chambly canal reaches the St. Lawrence at Sorel, 45 miles below Montreal and is a 7-ft. waterway, with locks 18 ft. wide. It was built when the seaport to which access was desired was Quebec. It makes the route to the St. Lawrence 105 miles long. This distance to free river navigation is reduced 83 miles by the proposed canal from St. Johns to Montreal. Arrangements are made in the plans to increase the depth of the Lake Champlain and St. Lawrence ship canal to 21 ft., when the Georgian bay canal is built, as it will really be an extension of that canal to Lake Champlain, and through that lake, and the old Champlain canal connecting Whitehall and Troy, to the Hudson river and New York.

It is expected that the completion of this canal will have the effect of bringing to American ports some part, at least, of the traffic which will be concentrated at Montreal by the system of Canadian artificial waterways. The St. Lawrence route to the sea is not attractive from the point of view of the marine underwriters, and the economy of shipments by way of New York is appreciated.

The old Champlain canal is a small affair, inadequate for the existing requirements of commerce. It has a draught of 5 ft. over the mortice sills at its locks, and the largest boats it will pass are barges of 140 to 150 tons. In the recent canal discussion at Albany the fact was brought out that part of the Champlain canal is under the control of the Federal government, which not only would do nothing to enlarge or improve it, but for strategic reasons would not permit it to be deepened to pass boats of 14 ft. draught.

The Pittsburg & Conneaut Dock Co. has given an order to the Webster, Camp & Lane Co. of Akron to equip its fast plant at Conneaut with the F. E. Hulett patent bucket. Twelve rigs are to be so equipped and to be ready by the opening of navigation in the spring.

TO AID CANADIAN COASTING TRADE.

To secure the coasting trade of Canada for Canadians the Dominion government has issued an order to the effect that when Canadian products or manufactures are transported or towed by Canadian vessels, even when they pass from one Canadian port to another over waters outside the limits of the Dominion, they shall be treated in regard to liability or exemption from duty as if the transportation or towing had taken place entirely within Canadian territory. Goods transported or towed in vessels not permitted to engage in the Canadian coasting trade are to be seized and forfeited. The new regulation reads as follows:

"Goods imported in bond or duty paid, and products or manufactures of Canada when transported or towed in or by vessel from one port or place in Canada to another port or place therein over waters outside the limits of Canada shall be transported or towed only in or by vessels permitted to engage in the Canadian coasting trade and under special customs manifests in such form and subject to such conditions as shall be prescribed by the minister of customs except as otherwise authorized by the governor-in-council, provided that the goods when transported or towed in conformity with this regulation shall upon arrival in Canada from any place beyond the limits of Canada be treated with regard to the liability or exemption from duty as if the transportation or towing had taken place entirely within the limits of Canada, provided further that goods transported or towed in or by any vessel not permitted to engage in the Canadian coasting trade contrary to this regulation shall be seized and forfeited."

PROTESTING AGAINST THE GOVERNMENT DREDGE.

A delegation of the lake dredging interests, including representatives from Cleveland, Buffalo, Chicago, Milwaukee, Detroit, Saginaw and Sault Ste. Marie, accompanied by members of congress representing the lake states, called on the president last week, protesting against the construction of a dredge by the government. They based their objections upon the ground that it was interference on the part of the government with legitimate private enterprise and represented that the work could be performed more cheaply by private interests than it could by the government. By the last river and harbor act the secretary of war was authorized to buy or build a dredge to be employed in Lake Erie ports, and he was authorized to divert $175,000 from Lake Erie harbor appropriations for that purpose. The act did not, however, require the secretary to build the dredge; it stopped with authorizing him to do so. After listening to all the arguments advanced, the president said that the matter was entirely in the hands of the secretary of war and suggested that the delegation call upon Mr. Root. The delegation did so and the secretary took the matter under advisement. The Review has already expressed its opinion upon this project. It is one of very doubtful expediency.

SHIP BUILDING AT NEWPORT NEWS.

Newport News, Feb. 4.—The Pacific coast lumber steamer Francis H. Leggett, building for the Hammond Lumber Co., was launched at the ship yard Saturday morning, at 11 o'clock, being christened by Mrs. Archer Huntington, wife of the adopted son of the late Collis P. Huntington. Miss Frances H. Leggett, daughter of the man after whom the ship was named, was invited to serve as sponsor for the new vessel, but she was unable to be present. Several thousand people witnessed the launching. Immediately after the officials of the ship yard gave a post-launching luncheon at Hotel Warwick, in honor of the sponsor. Covers were laid for twenty-two. Among those present, in addition to the officials of the ship yard and some of the naval officers on this station, were Capt. Jansen, who will command the Leggett; Francis H. Leggett, of New York; Capt. Hulphers, who will command the new Old Dominion steamship Monroe.

The Francis H. Leggett is the first vessel built here to be equipped with burners for the consumption of oil as fuel. The two Luckenbach steamships, Sarah V. and Harry Luckenbach, were converted into oil carriers and supplied with oil burners here, but were built elsewhere. The dimensions of the new ship follow: Length over all, 259 ft.; length between perpendiculars, 240 ft.; beam, 41 ft.; depth, molded, 19 ft.; draught, 16 ft.; displacement, 3,600 tons. She will be equipped with triple-expansion engines, the cylinders being 18, 28½ and 48 in. in diameter with stroke of 40 in. She will have two main boilers, each 12 ft. long and 13 ft. in diameter. In three months the Leggett will be completed and ready to be turned over to her owners.

According to information received here there seems to be little doubt that the W. R. Trigg Co. at Richmond, which went into the hands of receivers several weeks ago, has passed to the United States Ship Building Co. The receivership will be dismissed in the next few days, and possibly next week the plant will resume operations.

The new torpedo boat De Long, built by the Lawley company at Boston, was given a satisfactory speed trial in Chesapeake bay over the government course. The contract speed is 28 knots and she developed as much on her trial. Another trial will be held in a few days, and on the result of this test will depend her final acceptance by the government.

The United States collier Sterling sailed from Hampton Roads several days ago with coal bound for League island, where she coaled the United States battleship Maine and the protected cruiser Minneapolis.

The naval cadet training ship Chesapeake is at the navy yard for extensive repairs, preliminary to the annual spring cruise.

OVER SEA TRADE.

Editor Marine Review:—The following comparative figures show at a glance our great need of more ocean-going merchant ships to save the $213,000,000 which we are now paying yearly to foreign owned vessels, for the carrying of 92 per cent. of our exports and imports:

	Yearly average trade.	Ocean tonnage.
British Empire	$6,783,722,000	10,908,487
Germany	2,710,035,000	1,941,645
France	1,562,010,000	1,110,988
Italy	396,755,000	999,918
Japan	298,250,000	863,830
United States	2,427,555,000	889,129

We have only 3 per cent. ocean tonnage more than Japan, while our over sea trade is 700 per cent. greater. Comparatively we are 697 per cent. short. Italy has 13 per cent. more than we have, though her over sea trade is only one-sixth as large as ours. Great Britain's ocean tonnage is 1,100 per cent. greater than ours, though our over sea trade demands a tonnage of 40 per cent. of hers. Germany exceeds our ocean tonnage more than 100 per cent., while the excess on an even deal should be less than 10 per cent.

France has 25 per cent. more tonnage than we have, though her over sea trade is 35 per cent. less than ours. Congressional aid is the only remedy. Will congress administer it?

WALTER J. BALLARD.

Schenectady, N. Y., Feb. 2.

IVERNIA'S SPEED AND COAL CONSUMPTION.

Editor Marine Review:—You recently published a paper on the economy of large ships by Mr. A. W. Robinson, in which the writer refers to the Saxonia, of the Cunard Line, as a very successful and economical ship, of which the average speed is 14.5 knots on 138 tons consumption of coal. I wish to point to the fact that the steamship Ivernia, which is a sister ship to the Saxonia, and which was built by Messrs. C. S. Swan & Hunter of Wallsend, England, has an average speed from port to port of about 15.5 knots on a similar consumption of coal to the Saxonia. The Ivernia has, in fact, made one run from port to port across the Atlantic of 16.3 knots. She is of the same dimensions and deadweight capacity as the Saxonia, and of the same power of machinery. The Saxonia is unquestionably a good ship and it seems that the speed of 14.5 knots, with which she is credited, is rather an under-statement of her average, although she is not as fast a ship as the Ivernia.

CLARENCE I. DE SOLA.

Montreal, Jan. 29, 1903.

At the close of a meeting of the directors of the United States Steel Corporation, held in New York this week, Judge Gary gave out a statement to the effect that the Steel Corporation at the present time has orders on its books for over 5,500,000 tons, which are the largest unfilled bookings the company has ever had. The books for subscription to stock under the profit-sharing plan closed Saturday evening, Jan. 31, and the stock was subscribed for as follows: Exactly 27,633 men subscribed for 51,125 shares. Class E, composed of men who receive salaries of $800 to $2,500 per year, subscribed for 29,013 shares, 14,260 men subscribing. Class F, composed of men who receive $800 or less in wages, subscribed for 15,038 shares, 12,170 men subscribing. The board of directors voted to allot to class F all the stock they subscribed for, and to class E 90 per cent.

A steam turbine yacht, the Lorina, which Messrs. Ramage & Ferguson, Ltd., Leith, have built to the order of Mr. A. L. Barber of New York, was launched from the builders' yard last week. She is nearly 300 ft. long over all, 253 ft. on the water line and 33 ft. beam. The Lorina is fitted with three independent compound steam turbines—one high-pressure and two low-pressure—and the reversing turbines work in co-operation with the lower. Each of the three turbines drives a separate shaft, the center shaft having one propeller and the outer shafts two each. The boilers, of which there are four, are of the cylindrical type, with 8,500 sq. ft. of heating surface and 220 sq. ft. of grate surface. The working pressure is 180 lbs. to the square inch, and Howden's forced draft is used.

The Charleston navy yard is building a steel tug, the first steel vessel it has ever been called upon to construct. The tug will be 102 ft. 6 in. long and 21 ft. beam. Her estimated cost is $75,000. Naval Constructor Baxter is superintending the work.

RECENT SUBMARINE INVENTIONS.

There is in Italy a clever engineer named Guiseppo Pino whose submarine inventions are attracting attention in his own country and in France. If the claims of his friends are to be relied upon, within a few years he is likely to be as famous as Marconi, while the benefits which his work will confer upon the commercial world, as well as upon science, are inestimable.

Every year a considerable number of ships are lost, in most cases irretrievably, as a result of the lack or inadequacy of means to save them or recover them. For practical purposes there are at present only two methods of recovering sunken ships, and of these the one most used consists in sending down divers, who carefully caulk the lakes and outlets of the sunken vessel, which is then emptied of water by powerful air pumps. Considering, however, that no air pumps can work at a depth of more than about 28 ft., it is evident that there can be no salvage by this means from any greater depth. And although in some cases air pumps are found to work satisfactorily, their use entails great danger from the enormous pressure upon the outside of the sunken ship, wnen once emptied of water. This pressure is so great that in many cases it has crushed in the deck, rendering impossible any further operations. This has occurred even when divers have propped up the deck with all possible care in anticipation of disaster. In those cases in which work by air pumps is impossible, two or more vessels, or pontoons are placed over the sunken ships. They are then filled with water until the sinking point is almost reached, and are firmly bound to the sunken vessel. The water being then pumped out of the floating ships, they rise, thus lifting the wreck, which is then towed towards the shore where it is allowed to run aground. This operation is repeated till recovery is effected, which is not very frequent, so many and so great are the difficulties. Its success demands a perfectly calm sea—otherwise no work of the kind could be done without very serious danger—and the sea-bottom must be smooth and gradually shelving. At best, however, the process just described is limited to cases in which it is possible for divers to work, i. e., where the water does not exceed 90 to 100 ft., although in a few instances divers have been known to work at lower depths. Other means of raising wrecks have been investigated and tried but nearly all have proved useless or unsatisfactory compared with the one described.

To sum up, the following conclusions must be drawn:

The salvage of sunken ships is always difficult and often impossible, if assistance be not prompt and the means at hand ample.

The recovery of sunken ships is in most cases limited to those lying at a depth reachable by air pumps—a maximum of 35 ft.—or to that attainable by divers—a maximum of about 100 feet.

The recovery from the bottom of the sea of parts of ships or objects of any kind is not possible by existing methods, unless they are of small weight, empty of water, and lying at a depth not greater than that which divers can reach.

Although the salvage and recovery of sunken vessels is a limited industry, it is a lucrative one. In most cases the amount paid to salvage and recovery companies exceeds half the value of the property recovered. The largest profits appear to have been made by a Swedish company, whose operations during the past few years have been 1,500 in number, out of which they are reported to have secured a profit of no less than $30,000,000. The annual losses on the coast of the United States are numerous, representing manv thousands of dollars, and in a vast number of instances recovery is impossible, the methods already mentioned being inadequate. When we consider that only a small proportion of the ships sunk can be recovered by the means hitherto known and used, we can realize the importance of any invention by which sunken ships or objects of any kind can be recovered at great depths. While nobody will deny the possibility of accomplishing much more than can be done at present, yet all experts are naturally sceptical when they hear of inventions for which claims, which seem extravagant, are made.

Signor Pino's device consists of a working submarine boat, which has made such an impression in Italy upon those who have seen its operations as to enable them to assert that its efficiency will be certain to lead to remunerative results. The gentlemen who were present at the experiments made with Signor Pino's boat during the past summer on the Gulf of Genoa in the presence of representatives of the Italian navy were given an opportunity to study the invention from a technical standpoint, and it is said that they are now willing to testify to its value. More than this does not seem to be claimed by any impartial observer, and the inventor's experiments have not yet been witnessed by any engineer of international repute. On the occasion referred to, Mr. Pino is reported to have descended in his boat to a depth of 300 ft., and he is also said to have brought up a sunken boat of small size in less than fifteen minutes from the time of leaving the surface. Such a claim as this is, of course, new, and cannot be accepted without further and more detailed information. Up to now whatever has been printed upon Mr. Pino's inventions has been in either Italian or French.

No diver being able to work at a depth of more than 100 ft., on account of the enormous pressure to be supported—a pressure which at a depth of 135 ft. is not less than 10 lbs. per centimeter on the surface of the sea—Mr. Pino has spent much time and money in attempting to construct a submarine boat by which he can resist this formidable pressure, and can work at practically any depth as freely as if on the surface. This attempt, according to such reports as are obtainable, has now been successful. Mr. Pino's boat is of steel spheroidal in form. Its owner states that it will resist pressure as though made in one solid piece, the rivets used not serving for resistance, but for connection alone. For work on the bottom of the sea, the Italian engineer has invented a mechanical arm which, he affirms, is capable of all the movements of the living human arm—that is, can be bent, contracted and extended in all directions, and can seize and cut anything that mav be desired. Two such arms, fitted to the boat by an ingenious contrivance perform together on a large scale such operations as are possible to a pair of human arms. If this is really a fact, dynamite can be placed at any desired spot, or a cable can be cut, laid, or repaired on the sea-bed, the operators working inside the boat.

Mr. Pino like most other inventors, is more than enthusiastic concerning the possibilities of his boat, and in order to realize its value, he asks that the following points be kept in mind. It is only fair to say, however, that complete proof of their accuracy is not obtainable, and they certainly sound extravagant.

Every kind of operation for the salvage or recovery of ships or objects can be done with great ease by means of this small boat of about three meters diameter.

The boat has been tested to a depth of 150 meters, and the inventor, who has descended in it to the sea-bottom at least 140 times, has successfully worked at a depth of 130 meters—430 ft.

Two persons can work in the boat on the sea-bed for twelve hours continuously without needing to return to the surface for air.

Every object lying in the sea is clearly and distinctly seen from the boat, at almost any depth, through windows of a special crystal.

The boat, which can be set in motion or stopped very suddenly, will ascend or descend at will at a speed of about 3 meters per second. It will stop and remain immovable at any depth and for any length of time, perfect equilibrium being maintained.

The boat will "walk" on the sea-bed, moving freely on an ingenious single wheel, propelled by an electric-driven screw.

When submerged, there is telephone communication between the boat and the surface, so that orders can be given or received by the operators.

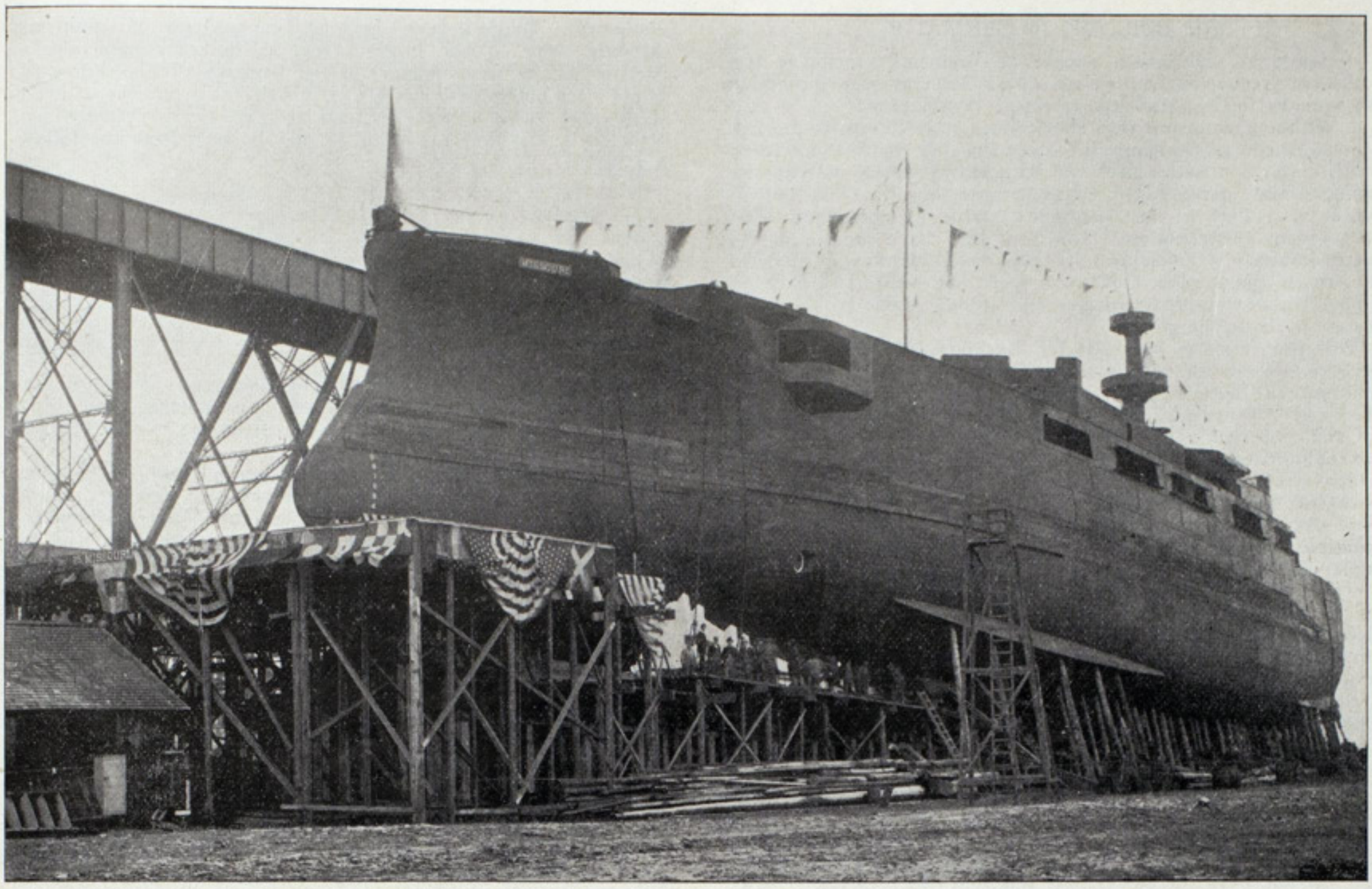
If the above details are accurate and reliable, Mr. Pino's invention is of first-class importance, and the hitherto unsolved problem of submarine operations will soon rank among the troubles of the past. It would appear that the recovery of objects from the sea-bottom or from a sunken ship is by means of this invention made simple. Suppose that it is desired to bring up gold from a sunken steamer. Dynamite is carefully laid on the wreck, and exploded by electricity from the surface. The deck or other desired part of the wreck being thus destroyed, to give access to the hold, the submarine boat proceeds to extract the objects therefrom. Such parcels as are too heavy to be brought up by the mechanical arms are recovered in the following manner: A signal goes directly from the boat to the surface at a point exactly above the weighty object. From this spot, large pincer-dredges, similar to those in use for the recovery or conveyance of coal, are lowered from a steamer; these, as soon as they touch the object, close upon it automatically, and it is then hoisted to the surface.

The king of Italy has already conferred some special honor upon Mr. Pino as a reward for his services to commerce in inventing this submarine working boat.

THE HYDROSCOPE.

Mr. Pino has another invention which, so say the Italian journals, will "make a noise" in the scientific world. It is called a "hydroscope," and it is intended to enable a person to see clearly any object in the water—under favorable conditions, down to the bottom. That any instrument will accomplish this appears improbable, yet far stranger things are possible. According to the inventor, the use of the hydroscope will enable the operator to photograph almost any thing that can be seen in the water; and, in addition, to recover articles from almost any depth. All of these operations, it is claimed, can be performed at a reasonable expense while standing in an ordinary small boat on the surface of the sea.

A private experiment was made in the Mediterranean sea, some three months since, only one spectator being present. The result has been described as simply incredible. "A large volume of water—about 15,000 cubic meters—covering an area of 1,500 meters perimeter, was so brilliantly illuminated that all objects moving in this body of water, or lying on the illuminated sea-bed were clearly and distinctly seen." This is a most remarkable statement, but it is unfortunately unaccompanied by any description of the apparatus by which the work was done. The hydroscope used was small and inexpensive, and we are told that the instruments to be manufactured for trade purposes will be reasonably cheap, although much larger than the one mentioned above. The inventor of the hydroscope has, up to now, refrained from making public any details concerning his instrument, so that nothing is known of its character. Assuming that he has succeeded in constructing an apparatus that will en-



The Battleship Missouri as She Looked Just Prior to Her Launching.

[Building by the Newport News Ship Building & Dry Dock Co., Newport News, Va.

able anybody to look down into the sea for some distance—and nothing else—it is evident that there will be disclosed to us an unknown world full of riches. Marine zoology and botany, in which, owing to our lack of means of pursuing investigations, progress has been slow, will now be open before us, and we may hope to become acquainted with a mineralogy which we shall find more wonderful than our own, and which has not been partially exhausted by centuries of investigation.

Success on the part of the hydroscope will make hydrography a certain, if not an exact science, no longer based upon conjecture. Moreover, the laying of telegraphic submarine cables or torpedo wires will be made easy, as will the cutting of them during a war in order to isolate the enemy. If Mr. Pino's hydroscope can be relied upon to accomplish what is claimed for it, naval warfare will change very materially, for the enemy's torpedoes and submarine boats will be of comparatively little use, as the commander of a war ship will be able to see them, and therefore to fire at them before they can do him any harm. The mercantile marine will derive great benefit from this invention, provided that its value has not been unreasonably exaggerated, for it ought to aid captains of ships in locating rocks and sandbanks which are now invisible, and in finding out the cause of damage to the ship and its proper remedy. As things are now, when a ship is wrecked, it is very difficult—sometimes impossible—to ascertain to whom the disaster was attributable, or to attach the blame to anybody in particular. The captain is usually judged by the testimony, not always accurate, of persons who escaped from the wreck, but in future, if the hydroscope is a success, their evidence will have quite a limited value, because a careful examination of the sunken vessel by means of this instrument will demonstrate what was the true cause of the wreck. To show the importance of this, reference need only be made to the British ship Victoria, which was sunk in a collision near Tripoli (Turkey), and whose case is now before the British law courts. In order to ascertain, if possible, who was to blame for the accident, a reward was offered to anyone who could conclusively prove exactly what part of the ship was struck. Mr. Pino claims that divers will find the hydroscope of considerable assistance, as it will enable them to receive necessary materials without error. Their personal safety, he says, will be much greater than it has been in the past. Fisheries will benefit considerably. In the lower levels of the sea the fish are so very numerous that they have at times almost obscured Mr. Pino's view from his submarine boat. The use of the hydroscope, we are assured by the inventor, will augment the trade in sponges and in coral, and even this is not all. Nobody can estimate the riches which for many centuries without interruption the ocean has swallowed up, and still continues to swallow up. In order to get a fair idea of the importance of Mr. Pino's inventions, if the assertions concerning them are reliable, it is only necessary to call to mind a few cases of ships which were wrecked when carrying, among other things, metals of considerable value. The war ship Black Prince was wrecked during the Crimean war (England versus Russia) in the Bay of Balaclava with, it is said, $100,000,000 in gold and silver on board. The armored ship Victoria, already referred to, carried a large amount of modern ordnance and some gold. The French transatlantic steamer La Bourgoyne had in her hold some $2,000,000 worth of zinc when she went down, all of which was, of course, lost. There is no occasion to name other instances, for they will at once occur to everybody who is interested in shipping.

In conclusion, it may be said that if Mr. Pino's working submarine boat and hydroscope have been correctly described, and if they will accomplish a substantial part of what is claimed for them, some remarkable surprises, to say nothing more, are in store for the commercial world as well as for the scientific portion of the community. Detailed information of the Italian engineer's inventions will probably be at our disposal before the first half of 1903 has passed.

TRAFFIC OF THE KAISER WILHELM CANAL.

As reported in the Riga Industrial Gazette the available statistical data on the traffic of the Kaiser Wilhelm canal during the first full six years from July 1895 to 1901, show a total of 145,159 ships as having passed the canal. The total net registered tonnage was 17,450,609 and passage charges equal to 9,078,621 marks, or about $10,000,000 have been paid. The traffic during siv years was as follows:

	Ships.	Net reg. tons.	Tolls in marks.
1895-96	16,834	1,507,983	888,780
1896-97	22,081	2,036,861	1,047,900
1897-98	23,149	2,648,347	1,363,085
1898-99	26,254	3,205,855	1,734,179
1899-1900	26,527	3,703,574	1,894,969
1900-01	30,314	4,347,989	2,149,708
Total	145,159	17,450,609	9,078,621

As seen from the above table the number of ships has increased in the sixth year by 80 per cent., the number of net registered tons by 188 per cent., and the tolls collected by 142 per cent. as compared to the first year. It is true that even the sixth year has not yet reached the estimated traffic of 5,500,000 tons, and the income was not yet sufficient to pay all expenses of management and maintenance, but many additional improvements have been made during the year. It may be mentioned that the Kaiser Wilhelm canal had already in its fourth year more traffic than the Suez canal has had in its tenth year, namely, 3,205,855 tons, as against 3,057,421 tons, without counting war ships in the former canal.

SHIP BUILDING IN GERMANY.

Henry W. Diederich, consul at Bremen, contributes the following account of the development of Germany as a ship building country to the state department at Washington:

Within a comparatively short time great things have been accomplished in Germany in advancing her marine interests. With a spirit of enthusiasm and with extraordinary activity the builders and managers of German steamship lines set out to build up a fleet of merchantmen capable of competing with that of any other nation. How well they have succeeded, the world knows. Wonderful, indeed, has been the advance made in the size, in the number, and in the speed and comfort of German ships that now carry passenger and freight traffic to the most distant ports on the globe.

This progress has been effected largely within the last three decades. About the time that the Germans entered this field of building all those engaged in ship construction began to use steel and iron instead of wood, and they were thus able to profit by the experience of others. Their unprecedented success has culminated in the twin-screw steamer Kaiser Wilhelm II, which was recently built and launched at Stettin, and will start on its maiden trip from Bremen to New York on April 14, 1903. Not less than 11,000 tons of steel and iron and other ship building material were welded and riveted and hammered together at the Vulcan yards to form this latest ocean leviathan.

The first Atlantic steamship which adopted a screw propeller in addition to the side-wheels was the world-renowned Great Eastern, built in the years 1852-1857. The gradual elimination of side-wheels and the general adoption of screw propellers for ocean steamers dates from that time. The improvement in the propelling machinery was equally marked, the simple cylinder system being supplanted first by the double, then by the triple, and finally by the quadruple-expansion system, which used the steam a corresponding number of times, thus causing a considerable saving in coal. Finally, steel completely superseded iron and wood in the construction of large steamers. All these improvements aided the industry in Germany, but it was not until the year 1897 that a German steamer was run off from the stocks that was destined to break records for speed. This was the Kaiser Wilhelm der Grosse. In 1900 the Deutschland was launched. In 1901 the Kronprinz started on her phenomenal career, and will be joined in a few months by the Kaiser Wilhelm II. All these were built at the Vulcan yards at Stettin by German brains and German hands. How these compare with other ocean greyhounds will be seen from the following table:

Steamer.	Line.	Lgth.	W'th	Reg'd. Ton'ge.	Speed	H. P.
		ft.in.	*ft.in.*	*tons*	*knots.*	
Lucania	Cunard	622 0	65 0	12,950	22	27,000
Kaiser Wilhelm der Grosse.	North German Lloyd	649 5	66 0	14,349	23	30,000
Oceanic	White Star	704 0	68 0	17,040	21	23,000
Deutchland	Hamburg-American.	684 0	67 0	16,502	23 5	37,000
Kronprinz	North German Lloyd	663 4	66 0	14,908	23.5	36,000
Kaiser Wilhelm II.	do.	706 6	...	20,000	23.5	40,000

Thirty years ago, there were only seven ship yards in this country; to-day there are about sixty, large and small. Five are located in this section, on the banks of the River Weser between Bremen and Bremerhaven. While they are not equal to building the very largest types of merchantmen and war vessels, they are fully equipped for turning out ordinary ocean-going vessels of every description. These five concerns have been crowded with orders during the past few years and while many of the other industries in this country are languishing, the Weser ship yards are all doing a prosperous business, dividends ranging between 10 and 12 per cent. having been declared at their last annual meetings.

The Weser Aktiengesellschaft, the only concern located within the city limits of Bremen, owing to its steadily increasing business, is now building new yards, covering about six acres of land, a short distance down the River Weser, where it proposes to move its entire plant in the spring, to attain the much-needed room. At the general meeting of stockholders on Oct. 30, 1902 (when 12 per cent. dividends were declared, it was decided to increase the paid-up capital by 1,250,000 marks ($297,500), making a total capitalization of 3,750,000 marks ($892,500). The Weser Aktiengesellschaft owns two floating dry docks, in which ninety-six ships were overhauled and repaired during the past year. During the same period, there were turned out by this company one German cruiser, one freight steamer, and several other craft of various description, such as dredges, barges, etc. There are at present under construction three cruisers for the German fleet, one steamer, and one fire ship, aside from several smaller vessels, and orders have been booked for one steamer for the North German Lloyd, one large dredger for Hamburg, one freight steamer for the Neptune Steamship Co., and several other craft of less magnitude. The contracts already received promise to keep the men fully employed for more than a year to come.

On the right bank of the River Weser, near Vegesack, are the extensive yards of the Vulcan Ship Building Co. This plant, like the foregoing, is entirely modern, with large capital and equipment. While it is not in a position to build and equip fast Atlantic ships of the largest type, as does its namesake at Stettin—as the river channel at the frontage of the ship yards is not deep enough for vessels of this draft—a number of good-sized steel vessels for ocean service were quite recently constructed by the Weser Vulcan, as may be seen from the following list:

Steamer	L'gth	W'th.	Tonnage		S.eed	H. P.
			Gross	Reg'd.		
	ft. in.	*ft. in.*	*tons*	*tons*	*knots*	
Strassburg	402 0	64 5	5,057	3,232	11	2,400
Wuerzburg	402 0	64 5	5,085	3,246	11	2,400
Breslau	429 9	54 0	7,524	4,808	12	3,200
Brandenburg	429 9	54 0	7,532	4,808	12	3,200
Erlangen	339 0	47 4	5,2.0	3,135	11	2,700
Prinz Oscar	420 0	49 0	.....	.....	13	3,000

During the first six months of this year six ships were launched at these yards, and the firm has seventeen other vessels under construction, valued at about 16,000,000 marks ($3,808,000).

At the end of its business year (May 6, 1902) the Tecklenborg Co., at Bremerhaven, capitalized at 2,000,000 marks ($476,000), paid a dividend of 20 per cent. This concern was occupied to its utmost capacity during the entire year, and the repair and dry docks were continually in use. Six double-screw freight and passenger steamers and two very large sailing vessels were building, of which three steamers and one sailing vessel were delivered to the owners. This firm is famous all the world over for building sailing craft, and the vessel completed a few weeks ago is probably the largest in the world. Her name is Preussen. She is a five-masted, full-rigged steel vessel; steel sparred throughout. Her length is 440 ft.; beam, 50 ft. She has a carrying capacity of 8,000 tons, while her registered tonnage is 4,000. Recently, she started on her first voyage to the west coast of South America. At the close of its business year this company had four vessels under construction, and orders were booked for one lighter, one fishing steamer for the high seas, and one sailing vessel. The building of these seven ships and also of a bridge will keep the plant busy for some months to come.

The Rickmers, Rhederei & Schiffbau Co. at Bremerhaven, has three small steamers under construction. The entire stock of this company is held by members of the Rickmers family, hence no annual reports or statistics are made public.

The G. Seebeck Co. at Bremerhaven, closed its seventh business year on June 30, 1902, when a dividend of 10 per cent. was declared. These works have also been very busy, especially in constructing steamers for fishing on the high seas. Three of these were completed during the year, while eleven, representing a value of some 3,500,000 marks ($833,000), are still under construction. During the same period, they built two passenger and freight steamers for East Asiatic coast service, one steamer for the Australian line, and one tugboat, all for the North German Lloyd Steamship Co. In the last seven years, this company has built 192 ships, of which 23 steamers were for the North German Lloyd. The paid-up capital of the Seebeck company has been increased by 1,000,000 marks ($238,000), making a total capitalization of 2,200,000 marks ($523,600).

Germany is geographically not strictly a maritime nation—that is to say, she is not located "by the sea," as the waters to the north are practically an inland sea. No other country is so dependent on others for the raw materials that enter largely into the making of a ship. Even her native iron must be mixed with Swedish ores to make it fit for modern purposes. Yet, in the face of all these difficulties German enterprise has entered the field of naval architecture, and has brought about the marvelous growth and phenomenal success in ship building which is enabling Germany to step in one long stride from naval weakness to naval power.

Representative Dayton of West Virginia has introduced a resolution in congress requesting the secretary of the navy to send to congress the views and recommendations of the general board and the reports of the naval college in regard to increasing the naval establishment. The resolution asks that the secretary of the navy "particularly be requested to inform congress of the appropriation necessary to annually increase the navy to the extent of four battleships, this increase to be in addition to that necessary to provide for deterioration or for loss in strength resulting from wreckage or from striking from the naval register crafts of obsolete design." It also asks for information as to the amount necessary for the pay of additional officers and his opinion as to the wisdom and practicability of admitting to the naval service the elect of technical schools as ensigns on probation.

Perfect Passenger Service.—Every comfort afforded by the highest grade of modern train service is secured by travelers via the Nickel Plate road and its connections on the semi-weekly trans-continental tours, with berth rates less than one-half the price of regular Pullman car service. Call on nearest agent. E. A. Akers, C. P. & T. A., Cleveland, O. 284, Mar. 1.

UNIFORMITY IN MARITIME LAW.

The International Maritime Committee is a central body whose function is to endeavor to harmonize the views of national committees or associations which have been formed to work upon specified questions in maritime law. The object of all this is to bring about uniformity of law in these matters in place of the legal discords which make the effects of collisions and other maritime casualties differ according to the place in which the settlement of them is worked out. The subjects so far dealt with have related to collisions at sea and salvages. The report of the latest conference at Hamburg has now come to hand. Resolutions upon collisions and salvages, after reports from the various national associations were come to at meetings held in Antwerp in 1898, in London in 1899 and in Paris in 1900. The first business of the Hamburg conference was to consider two short forms of treaty, which had been prepared by a commission appointed at Paris in 1900 and which were designed to give effect to those resolutions. The proposed form of treaty as to collisions would get rid of the special rules of some of the codes as to collisions with ships at anchor; also of the old rule, found in various codes, by which the damages caused by a collision are borne by the ships in equal shares when the collision cannot be shown to be the fault of either vessel. It proposes that where a collision is due to inevitable accident, or is without fault, or if the fault causing it is inscrutable, the losses are to lie as they fall. But the conflict of chief interest which the treaty would settle is that as to the apportionment of the losses where the ships in collision have both been at fault. In England and the United States the losses are usually equally divided in such cases. Each vessel bears one-half of the loss sustained by the other and receives from the other a contribution of one-half her own loss. But on the European continent (speaking generally) the law requires the court to apportion the total loss between the two vessels according to tne degree of fault which may be attributed to them. So that when one ship is only slightly and the other seriously to blame very different results may follow in the different courts. The conferences which have been held have approved of the continental rule. Then as to the measure of compensation the proposed treaty would overrule those codes which restrict this and which disallow claims for detention of the injured ship during repairs. It provides:

Article 5—Losses in case of collision are to be recompensed in full. They include especially the measure of actual detriment proved, the amount of the losses caused by the collision, the profits of which the injured parties are deprived, and indemnity in the nature of demurrage due to the vessels.

Further important provisions are that "the fact that the collision has been caused by the fault of a pilot whose employment is compulsory" is not to be a defence; that a seagoing ship in tow is to be liable for a collision caused by fault of her tug; and that, though "ships which have been in collision are bound to afford assistance as far as circumstances permit, the neglect to afford assistance does not entail a presumption of fault from the point of view of pecuniary responsibility for the collision." These provisions, abolishing the defence of compulsory pilotage and negativing a presumption of responsibility for the collision from the fact of failure to render assistance, are intended as alterations of the existing English rules. The provisions of the proposed treaty-code with regard to salvage do not call for much remark. The divergences of law on the subject are of less serious importance. But the distinction in French law between salvage (as of a derelict ship) and "assistance" is got rid of; as are also all hard and fast rules as to the salvor's receiving a fixed proportion of the salved values. French law in the case of a derelict would fix the amount at one-third in all cases.

Before the consideration of these drafts was entered upon, Dr. Guetschow, secretary of the Hamburg chamber of commerce, moved a resolution in favor of abolishing the liability of ship owners for collision damage, and recommending the conference not to continue the discussion of the draft as to collisions. His proposal was decisively defeated. Its rejection was moved by Gray Hill, vice-president of the Law Society, who was supported by Sir John Glover; and this was carried by the votes of every nationality except that of Germany. The German representatives were, by seven votes to three, in its favor.

The discussion of the draft treaty as to collisions resulted in only two material alterations of the draft. Article I. was altered, on the motion of Mr. Carver, (England), so as to state an agreement by the high contracting parties that they will take steps to modify the laws of their respective states on the subject of collisions so as to adopt the principles of the treaty. The other alteration was of Article II., to make it clear that, pending any further treaty, the existing laws as to liability are still to remain; and also that liability is to fall upon the delinquent ship owner according to the law enforced by the tribunal by which the case is tried. In the draft treaty as to salvage law only one important change was made. The commission had proposed to allow salvors their expenses and damages as of right, whenever successful assistance has been given. On the motion of Everitt P. Wheeler, (United States), supported by Mr. Carver, this was struck out. Salvors' expenses and damages were left, as at present, merely elements for the consideration of the court in making its award of salvage remuneration.

The conference then took up the new subject of the competence of tribunals in cases of collision. The discussions took place partly under the presidency of Dr. Sieveking, partly under that of Sir W. Phillimore. The first debate was upon the proposal of the French association that jurisdiction to try and dispose of a collision cause should be confined to the tribunals of the defendant's domicile or of the "port d'attache" of the defendant vessel. A good deal of confusion arose owing to uncertainty as to the meaning of the expression "port d'attache," some interpreting this as the port of registration, others as the home port, or port from which the ship is managed. Even among the French representatives this uncertainty appeared. Ultimately it was agreed that the jurisdiction should not be confined as proposed; also that, so far as relates to domicile of defendant, jurisdiction should be in the courts of the commercial as well as of the personal domicile.

A long debate arose on the question whether the courts of the place in which the collision has occurred should have jurisdiction, although the ship may not be arrested there, and although neither plaintiff nor defendant may be domiciled there. M. Franck argued that this should be so; that is the place of the wrong done; the best evidence can generally be got there; a prosecution may take place there, and the civil liability should be determined there also. Gray Hill resisted, and, in opposition to M. Franck's illustration of a collision in the Thames, suggested the case of one in the river Platte between two European ships. The main body of evidence, he urged, is generally in the ships themselves. Sir W. Phillimore supported M. Franck, urging that when a collision has occurred in territorial waters the judges of the national courts should have jurisdiction. Mr. Carver pointed out that that must be subject to the condition of serving process on the defendant or on the ship, and that, if the defendant or the ship can be found, there is no need to give jurisdiction to the courts of the place of collision. Dr. Sieveking spoke against the proposal, and urged the inadvisability of having too many tribunals. The question voted upon, as put by Sir W Phillimore, was whether the simple fact of collision within territorial waters should give jurisdiction to the courts of that state. The votes are taken by nations, and seven national votes against five carried the proposition. This vote brought out in a marked way the weakness in the constitution of the conference. The minority included France, Germany, Great Britain and the United States, each voting, almost unanimously, by several representatives. The majority included Austria, Hungary, Japan, Sweden and Norway, each voting by one representative. It was, therefore, not remarkable that, on the motion of Dr. Stubbs (London), it was subsequently agreed that it should be an instruction to the executive council to treat the vote as preliminary only, and to bring the matter forward for consideration again at the next conference. As Dr. Sieveking expressed it, the vote was to be considered as on a first reading only.

The next question voted upon was whether registration at a port simply should give jurisdiction to the courts of the place. This was carried by nine votes to four, Great Britain being in the minority. On the question whether the courts of a place at which the defendant ship can be seized should have jurisdiction, an animated debate took place. M. Autran (Marseilles) contended that the trial of the case should be at the ship's port of registration. M. Franck spoke strongly against this view; and M. Clunet (Paris) asked why final judgment was to be separated from the investigation of the facts of the case, which must take place at the port of arrest, and from the execution of the judgment at the same place. He urged that a court similar to the English admiralty court, which was probably transplanted originally from France, might well be recreated in France, so as to get rid of the present distinctions of jurisdictions arising out of territoral subdivision. M. Autran's amendment was lost, the French representatves being equally divided upon it (five to five).

A proposal that jurisdiction should be given to courts of a place at which another ship of the defendant's can be seized was lost; and the question whether mere service of the defendant within a state, without either residence or domicile there, should suffice to give the courts jurisdiction over him (as is the case in Great Britain and in the United States) was answered in the negative, the representatives of the United States only voting for the affirmative. Mr. Carver, however, pointed out that mere residence of the defendant for the time being should suffice, and that domicile ought not to be necessary; and it was left to the council to bring up a fresh proposition at a future time to make this clear.

Considerable debate occurred as to whether jurisdiction against one colliding ship should give jurisdiction also against the other in an action brought against both. The proposal was negatived, as also was the proposal that jurisdiction over the principal claim should give it also against insurers who may be liable for the loss. This completed the questions raised on the subject of jurisdiction. It had been intended to go on to the question of real rights and privileges against the ship, and their priorities, on which the diversities of law are very considerable. Dr. Sieveking pointed out the complexity of the subject and the impossibility of discussing it now, and he proposed that the bureau should be empowered to nominate a commission to prepare for a future conference. The proceedings were closed by a motion of thanks to Germany. Invitations for the next conference have been received from Holland and from Italy.

NEW YORK CANAL PROJECTS.

Six propositions affecting the canals of New York state are now under discussion in the New York legislature. First is the Bostwick bill which provides for the submission to the people at the next general election of a proposition to bond the state for not exceeding $82,000,000 for the enlargement of the Erie, Oswego and Champlain canals to suit 12-ft. barge navigation, with changes in the course of the Erie so as to avoid the Montezuma marshes and follow the course of the Seneca river, Onondaga river, Oneida lake and Mohawk river. This bill has passed its second reading.

Second, Senator Lewis's plan, providing for a continuance by the United States government of surveys for a ship-canal between Lake Erie and the Hudson.

Third, Senator Ambler's proposition favoring the amendment of the state constitution so that the canals can be sold or leased to the United States government.

Fourth, a proposition, not yet fully formulated, to issue bonds for $132,000,000, the whole to be expended under the general head of "internal improvement," at the discretion of the state engineer and surveyor, but with the understanding that $82,000,000 is to go to the canal enlargement; $25,000,000 to water storage, and $25,000,000 for half of the expense of road improvement (the counties paying half).

Fifth, to fill in the Erie canal and use it as the road bed of a six-track railroad to be leased by the state to the corporation bidding the lowest rate for transportation.

Sixth, a proposition to lease the canals to the company or corporation which is building the Georgian bay canal, Canada, so that they may come directly down through the Champlain canal and thence by the Hudson river to New York.

Assemblyman Graeff of Essex is sponsor of the Georgian bay canal scheme. This is a proposition to enlarge the Champlain canal to 21 ft. to provide an outlet to the sea for the proposed Canadian ship-canal that is to run from Georgian bay along the Ottawa river and Lake Nipissing to the St. Lawrence river, to Montreal, thence to St. Johns, by way of the Richelieu river to Lake Champlain and down the Champlain canal to the Hudson river.

ITEMS OF GENERAL INTEREST.

Nicholas J. Quirk, well known as a marine artist, is now connected with the Crescent Engraving Co., a new concern of 368-74 Dearborn street, Chicago.

Mr. Hiram Edward Manville of Milwaukee, Wis., a member of the H. W. Johns-Manville Co. was married in New York last week to Miss Henrietta Estelle Romaine.

Mr. R. L. Newman, consulting engineer and naval architect, has removed to the ninth floor of the Chesebrough building, New York, where he has taken a commodious suite of offices.

Senator Wellington has introduced an amendment to the constitution of the United States prohibiting any individual from accumulating a greater fortune than $10,000,000. Most of us will obey this law.

Mr. William Perkins Tyler, president of the Tyler Tube & Pipe Co., Washington, Pa., died recently. He founded the company in 1890. It will be continued by his associates upon the lines which he laid down.

There are six battleships, three large cruisers, six small cruisers, one gun boat and several torpedo boats in course of construction or completion in German ship yards. Of the six battleships at least four are expected to be launched within six months.

The new torpedo boat destroyer, the Stewart, has made her first trip as a commissioned vessel from the Brooklyn navy yard to Annapolis. The Stewart was built by the Gas Engine & Power Co., and Charles L. Seabury & Co., Consolidated, Morris Heights, New York.

Mr. Richard Mansfield, the actor, has purchased the famous schooner yacht Amorita. She is 99.5 ft. over all, 60 ft. on the water line, 20 ft. beam and 12 ft. gaff. The Amorita was designed by A. Carey Smith and built in 1895 by the Harlan & Hollingsworth Co., Wilmington, Del.

The house committee on appropriations has reported the sundry civil bill. The measure appropriates $78,007,929, being $8,886,432 less than the regular and supplemental estimates and $17,355,870 more than the appropriations for the current fiscal year.

The naval board of construction has accepted the model of the two gunboats Paducah and Dubuque, authorized at the last session of congress. The boats are to be of 1,080 tons displacement, of about 10 knots speed and will carry six 4-in. guns of the new type. The battery will be much more formidable than that of vessels of the Wheeling class.

The torpedo boat destroyer Eden, building by Hawthorn, Leslie & Co. for the British admiralty, to the order of the Parsons Steam Turbine Co. is to be propelled by steam turbine engines, the machinery being similar to that fitted in the Viper and Velox, but driving three, instead of four shafts, with two propellers on each shaft, or six propellers in all.

The Craig Metal & Chemical Co. has been incorporated at Hartford, Conn., with a capital stock of $5,000,000. Its officers are Alvin Craig, president; Thornley Dickson, vice president; E. Henry Bares, treasurer; Bayard Barnes, secretary. The company is to locate at Sault Ste. Marie and it is understood has contracted for power from the Consolidated Lake Superior Co.

A great increase is to be made this year in the number of steamers of the North German Lloyd calling at Plymouth on the voyage from New York to Bremen. Hitherto two or three only of the company's fast steamers have called at Plymouth while intermediate steamers have made alternate calls at Southampton and Cherbourg before proceeding to Bremen. In future all these vessels will call at Plymouth before proceeding to Cherbourg.

All the grand officers of the American Association of Masters and Pilots of Steam Vessels were re-elected for the ensuing year at the recent meeting in Washington. They are: Grand captain, John C. Silva of Dorchester, Mass.; grand first pilot, Charles Maytham of Buffalo; grand second pilot, N. L. Cullen of Camden, N. J.; grand captain's clerk, Benjamin F. Perkins of Camden, N. J.; grand purser and counsel, Luther B. Dow of Brooklyn, N. Y.

Surgeon General Wyman of the marine hospital service has decided to send a commission to Buffalo to examine and report upon a site for the new marine hospital provided for at the last session of congress. The commission will consist of Assistant Surgeon General Williams of the marine hospital service, Mr. Witmore of the supervising architect's office and the local officer of the marine hospital service at Buffalo. The commission will meet in Buffalo shortly.

Mr. George H. Gibson has resigned his position with the Westinghouse Companies' publishing department of Pittsburg, Pa., to accept a position with the B. F. Sturtevant Co. of Jamaica Plain Station, Boston, Mass., the well-known manufacturers of blowers, heating, ventilating and forced-draft apparatus, electrical machinery, and steam engines. Mr. Gibson was formerly a member of the editorial staff of the Engineering News, of New York city, and is a graduate of the engineering school of the University of Michigan.

David Phillip Jones, retired navy engineer, died at Pittsburg last week. He entered the naval service March, 1862, as third assistant engineer and was attached to the United States steamship Cimerone. During the civil war he was promoted several times and in 1867 was appointed passed assistant engineer. In 1873 he was attached to the bureau of steam engineering and from 1874 to 1879 he was instructor in steam engineering at the naval academy. His latest assignment was on the Ranger on the Pacific coast.

A schooner combination which is being formed on the Atlantic coast is to be known as the Coastwise Transportation Co. It will in all probability be managed by Capt. J. G. Crowley, whose nine vessels have been appraised at $997,000 and have gone into the combination upon that basis. The company, which is to be incorporated under the laws of New Jersey, will have a capital stock of $3,000,000, divided into $1,500,000 preferred and $1,500,000 common stock. The preferred is to bear a cumulative annual dividend of 6 per cent.

The three-shift system by which work will be kept up day and night will be inaugurated in the gun carriage shop at the Washington navy yard next week. There is an imperative demand for completing the orders now on hand and this step is taken with a view to expediting the completion of the work, the orders for which were given over two years ago. It is the purpose of the naval officials to keep the other shops at the yard in full operation during the entire day and night as soon as sufficient workmen can be obtained.

The gold medal annually given by the United States Naval Institute for the best paper on a subject nearly related to the navy was last week awarded to Prof. Philip R. Alger of the United States navy for his paper on "Gunnery in the Navy." The prize includes the gold medal, $100 in cash and life membership in the Institute. The following papers received honorable mention. "A Manual Training Plan and System," Lieut. J. H. Reed; "Systematic Training of Enlisted Personnel in Our Navy," Lieut. C. L. Hussey; "Our Torpedo Boat Flotilla: the Training Needed to Insure its Efficiency," Lieut. E. L. Beach.

Engineer Geo. W. Perkins, of Brooklyn, late of steamship Hawaiian, of the American-Hawaiian Steamship Co.'s fleet reports that that vessel on her trip from the Hawaiian islands to Philadelphia, sixty-six days, made the distance without a shut down of her engines being required from any cause and came into port in fit condition for a like run of sixty-six more days, but for lack of coal. The Hawaiian is the product of the Roach Ship Yard, at Chester, Pa., and has proved herself to be one of the best and staunchest vessels afloat and reflects much credit upon her designers and builders. Like most of the later steamships the Hawaiian is fitted with the Geo. F. Blake Mfg. Co.'s pumps.

The Overland Limited, solid train, Chicago to the coast daily. Chicago, Union Pacific & North-Western Line. tf.

TRADE NOTES.

The paper upon the steam turbine which Mr. E. H. Sniffin recently read before the American Street Railway Association in Detroit has been published in pamphlet form by the Westinghouse company and can be had at the nearest office of Westinghouse, Church, Kerr & Co. for the asking.

The business and affairs of the Q. & C. Co. have been consolidated with those of the Railway Appliances Co. and will be conducted under the name of the Railway Appliances Co. An announcement made by Mr. C. F. Quincy, president of the Q. & C. Co., asks that all correspondences and remittances be in the name of the Railway Appliances Co. He says that the consolidation allows greater facilities in the conduct of the business, increases the line of devices while retaining in the new company the individuals heretofore connected with the Q. & C. Co.

Fred H. Pell, No. 11 Broadway, New York, has selected as an illustration for his annual calendar J. G. Brown's painting "Heels Over Head." It is reproduced in the three-color process by the Osborne Co. of New York and is a striking bit of work. Brown's paintings of newsboys are exceptionally fine and this is one of the very best of them. Mr. Pell has shown rare discrimination in selecting it. Every boy in the picture is distinctly individual. Incidentally Thorn's ash ejector, Cooper's patent steam steering gear, "Improved" monitor air ports, capstans, gipsy windlasses, barge winches and brass work are advertised.

In a dainty little booklet devoted to their electric hoists the C. W. Hunt Co., West New Brighton, Staten Island, New York, say: "Electric motors are fast displacing steam engines and shafting in every industry on account of their convenience of installation and economy in operation. Nowhere is this saving more apparent than in intermittent hoisting work. With electric hoists there is no loss due to condensation in long steam pipes, which frequently amount to 25 per cent. of the power used, and there are no steam pipe lines with joints to be kept tight, as with steam engines. With shafting the loss in transmission of power due to the friction at the bearings is very high; at one steamship wharf in New York city it took three tons of coal per day to run the shafting alone. This loss is entirely eliminated with electric power. Electric hoists have a great advantage in the ease with which they can be moved from one point to another and are ready for operation by simply leading the wires to a source of electric power. They have the further advantage that power is used only when the hoist is in operation. Our hoists are simple, durable, convenient to operate, do not require a skilled or licensed engineer and their mechanical and electrical efficiency is of the highest order. They are not steam hoisting mechanisms with a motor attached but are new in form and carefully proportioned to suit the new motive power."

In the last issue of the Review reference was made to the Hydro-Carbon system for fuel economy on steam vessels, which is being applied by the Great Lakes Engineering Works of Detroit. Some reports of trials of the Oceanic Steamship Co.'s steamer Zelandia with and without this system were published. It is now announced that the Oceanic company's Sonoma of 6,200 tons and also three other steamers of the same line are to be similarly equipped. The Mineola is another steamer that is to receive the equipment on all of her boilers.

Attractive low rates to points in the west and northwest by way of the Nickel Plate road. Sale of tickets at all stations begins Feb. 15 and will continue daily up to and including April 30, 1903. Get particulars of nearest agent. E. A. Akers, C. P. & T. A., Cleveland, O. 286, Mar. 1.

Three solid through trains daily, Chicago to California. Chicago, Union Pacific & North-Western Line. tf.

MASTERS AND PILOTS.

St. Clair harbor, No. 50.—Captain, C. C. Balfour; captain's clerk, Frank L. Meno; delegate to grand harbor voyage, Capt. R. O'Conner; alternate delegate, Capt. C. C. Balfour.

Judge Swan at Detroit is at present hearing an interesting case involving salvage. The schooner J. S. Richards sank in the Detroit river off Walkerville after a collision with the steamer J. W. Moore. Capt. Harris W. Baker, wrecking master, made a contract with the underwriters, the Atlantic Mutual Insurance Co., for the removal of the cargo and hull. Capt. A. T. May, master of the Richards, then instructed Capt. Baker, it is claimed, to shift the Richards to the middle-ground below Belle Isle bridge, which was done. The federal authorities claimed the boat was a menace to navigation there and ordered it removed. It is claimed by Capt. Baker that Capt. May, when he ordered the Richards removed, acted as agent for the insurance company, which was liable for the work aside from lightering, this alone being covered by the contract. Baker's bill for salvage, which he seeks to collect, is $5,803.75.

The Holmes Ship Building Co., West Mystic, Conn., has secured orders for seven yachts for the New York Yacht Club. Their construction will be superintended by Charles T. Herreshoff, the designer.

The Pittsburg & Morgantown Packet Co. has let the contract for the rebuilding of the steamer Columbia to the Elizabeth Marine Ways Co., Elizabeth, Pa. The estimated cost is $25,000.

Chicago, St. Paul-Minneapolis, four daily trains via the Chicago & North-Western Ry. tf.

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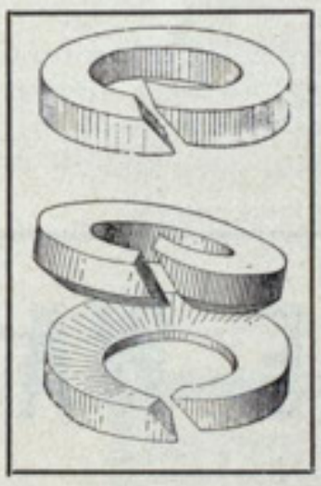

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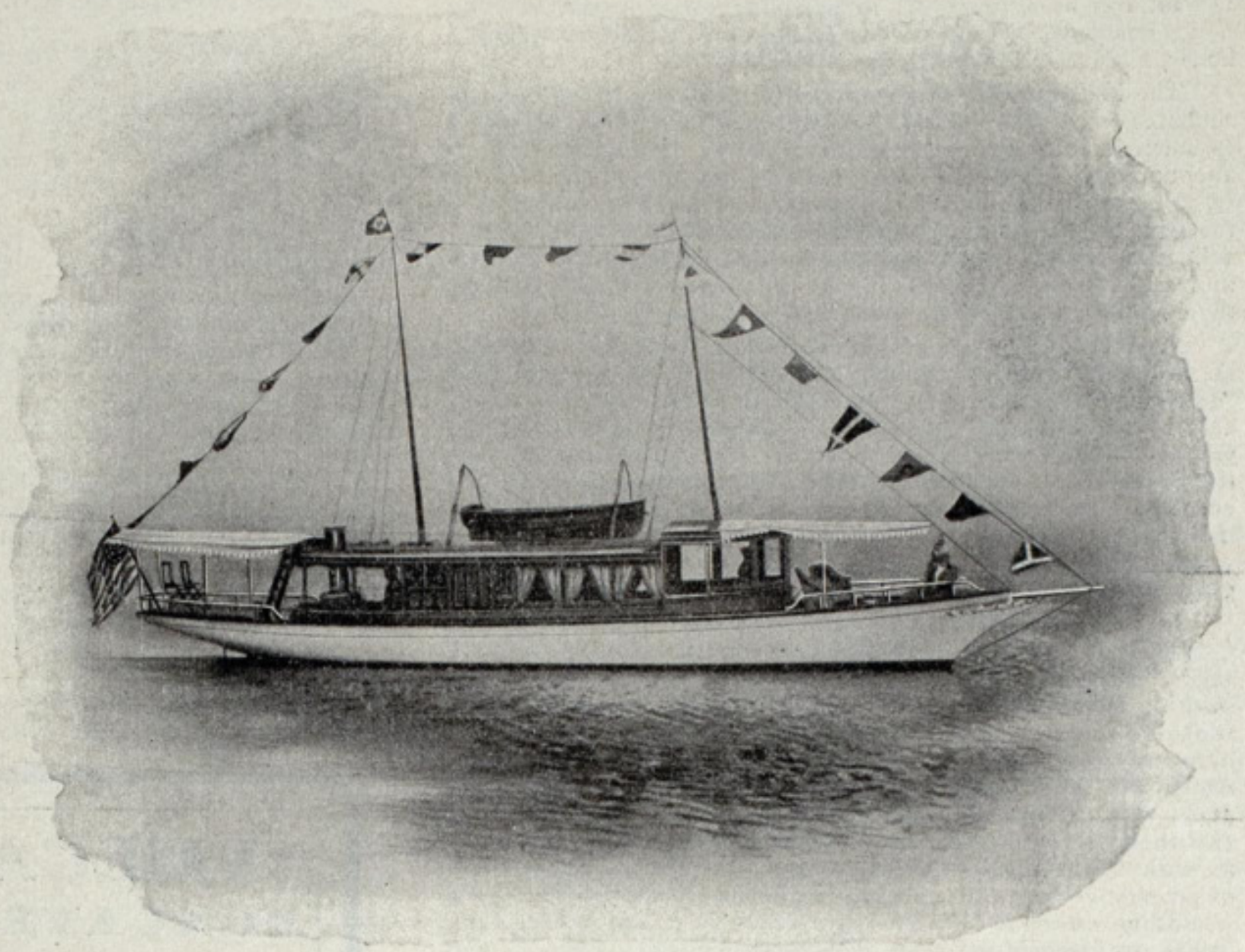
NAPHTHA LAUNCH OF HANDSOME MODEL.

The Gas Engine & Power Co., and Charles L. Seabury & Co, Consolidated, Morris Heights, New York, are receiving unusual success with their naphtha launches. An especially handsome little craft for which they are getting a number of orders is 50 ft. in length with a clipper bow, overhanging stern and schooner rig. It is shown in the accompanying illustration. This model combines beauty with comfort and speed with seaworthiness. It is not surprising that the model should have achieved distinct success. The company claims unusual advantages for their naphtha launches owing to the fact that they employ the expansive force of naphtha and not the explosive force of gasoline. It is impossible to overestimate the pleasure which may be derived from a craft of this kind. They are capable of cruising into all sorts of crannies and nooks and one may be reasonably independent of wind and weather. This most excellent type of naphtha launch is finding its way into the great lakes. Mr. Will Huntington, commodore of the interlake fleet, brought one to the lakes, via the Erie canal, and speaks in the highest terms of its seaworthiness and general desirability. By the way, the Hudson, the Erie canal, the great lakes and the St. Lawrence river make an unrivalled waterway for craft of this character and afford a trip of unending variety and delight. The venturesome could even project it into the Gulf of St. Lawrence and around the Atlantic coast. But the trip especially recommended is to St. Clair flats, the Venice of America, where one may fish among a myriad islands and see the heaviest commerce of the world go by while he lies perfectly secure out of the channel pursued by the great beasts of burden.



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Total Horse Power of Boilers in Use	1,501,520

WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.

TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.

THE ANTHONY POLLOK PRIZE.

It is a pity that the excellent intentions of the heirs of the late Anthony Pollok have hitherto been incapable of fulfillment. At the close of the exhibition of life saving apparatus held at Havre in September, 1901, under the auspices of Mr. Pollok's heirs, some surprise was occasioned by the fact that not one of the many ingenious instruments and contrivances sent in for the competition obtained the prize of 100,000 francs which had been offered.

The failure did not appear to be owing to any want of skill on the part of the inventors, but rather to the stringent conditions under which the competition was instituted, which had for their consequence the systematic rejection of all the objects presented—with the partial exception of one exhibit, for which a sum of 10,000 francs was awarded. This unsatisfactory result induced Mr. Pollok's heirs to address a letter to the president of the Association Internationale de la Marine, in February last asking for the advice of that body on the following question: "Under what conditions, and in what shape do you consider that the Anthony Pollok prize may some day be awarded, in order that the name of Anthony Pollok may be connected with some mode of preservation from the dangers of the ocean?" The association charged one of its members to study the question and report on it, and his report has just been rendered. He is of opinion that it would be best to abstain from offering a single prize of large value to be awarded after a single competition at a date fixed upon, and in place of that he advises that a "Pollok foundation" should be established and made permanent. The interest on the capital invested, he suggests, and the interest alone, should be distributed periodically in the shape of prizes, diplomas, or medals, awarded for various categories of apparatus or inventions calculated to attain the proposed ends. The prizes might be delivered to the recipients by the association at its annual congresses, according to the awards of the international jury composed of competent men connected with shipping. This international jury, the report says, should only have submitted to it such designs, apparatus, or inventions, as shall already have been brought before national local juries and recognized by them as fulfilling the conditions imposed by the program established by the heirs of the late Mr. Anthony Pollok or by a committee appointed by them. According to this plan, the international jury, judging in the last resort, would only have to examine and pronounce on apparatus and inventions of real value, and would not have to occupy itself with the projects of inventors animated by the best intentions, but of relatively little practical value. The association, on its part, would only intervene as the mandatory of Mr. Pollok's heirs in the administration of the Pollok foundation.

The report of the Pressed Steel Car Co. for the year ended Dec. 31, is one of the most remarkable ever issued by an industrial company. It shows an increase of $2,631,308 in surplus, the total surplus now standing at $4,331,480 as compared with $1,700,172 on the corresponding date of last year. The surplus accumulated by the company during the year just closed is equivalent to more than 20 per cent. on the outstanding common stock of $12,500,000. At the regular meeting of the board of directors last week the regular quarterly dividend of 1¾ per cent. on the preferred stock and the regular quarterly dividend of 1 per cent. on the common stock were declared. An extra dividend of 1 per cent., payable in four quarterly installments, was also declared on the common stock.

John McDonald, Stonington, Mass., is to build a four-masted schooner for Capt. C. A. Davis of Somerset, Mass. The vessel is to be 190 ft. over all, 36 ft. beam, 13 ft. draught and of 1,200 tons burden.

Sealed proposals will be received at the office of the Light House Engineer, Detroit, Mich., until 3 o'clock p. m. on Monday, March 2, 1903, and then opened, for furnishing the material and labor necessary for removing the wooden superstructure of the foundation pier of the Cheboygan Crib Light Station, Mich., and rebuilding the same in concrete and masonry. Information furnished on application to Captain LANSING H. BEACH, Corps of Engineers, U. S A., Engineer, 11th Light House District. Feb. 19.

Tug Wanted.

Wanted—A tug about 65 ft. long with draught not exceeding 7 ft. Must be strongly built and in good condition, with good towing power for its size. British bottom preferred. Address The Lake Superior Timber Co., Ltd., Port Arthur, Ont.

Feb. 19.

Steamer for Sale.

Steamer T. D. Stimson for sale. Capacity 550,000 ft. lumber. Rates A-2; fully rebuilt two years ago. Will take smaller steamer part payment. Address A. B. Slyfield, owner, Port Huron, Mich. Mar. 5.

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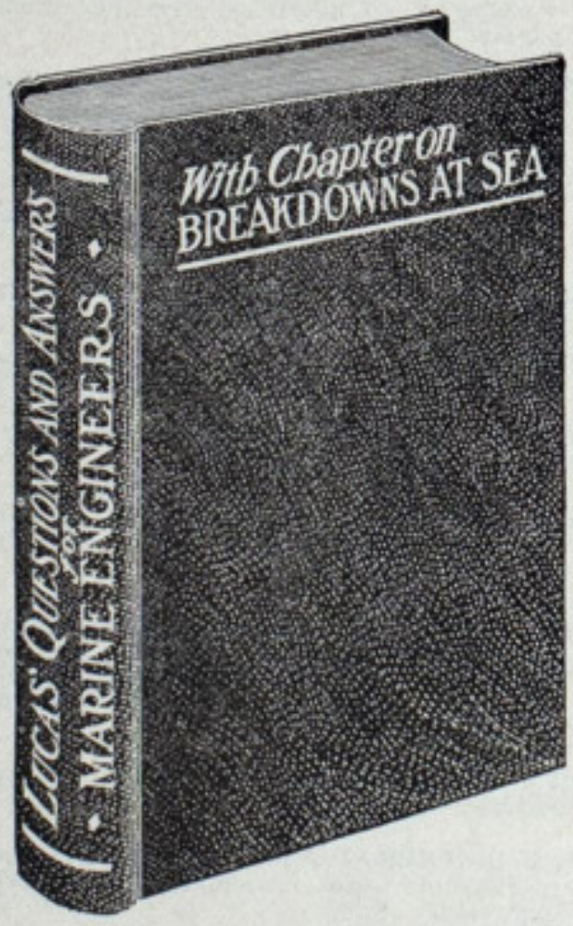

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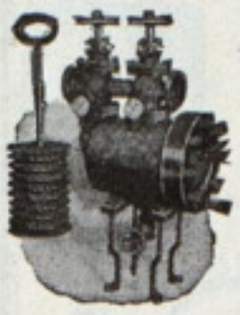

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U. S. Engineer Office, Grand Rapids, Mich., Jan. 20, 1903. Sealed proposals for repair of piers at St. Joseph and Black Lake, Mich., will be received here until 3 p. m., Feb. 19, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt., Engrs. Feb. 12.

U. S. Engineer Office, Duluth, Minn., Jan. 19, 1903. Sealed proposals for pier work and dredging at Port Wing, Wis., will be received here until noon, Feb. 19, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. Feb. 12.

U. S. Engineer Office, Duluth, Minn., Jan. 24, 1903. Sealed proposals for furnishing and placing about 26,000 tons of riprap at Ashland, Wis., will be received here until noon, Feb. 24, 1903 and then publicly opened. Information on application. D. D. GAILLARD, Capt., E grs Feb. 19

U. S. Engineer Office, Grand Rapids, Mich., Jan. 6, 1903. Sealed proposals for repairs of piers and closing entrance to outer basin at Michigan City, Ind., and for repairs of north pier at Grand Haven, Mich., will be received here until 3 p. m., February 5, 1903, and then publicly opened. Information furnished on application. Charles Keller, Capt. Engineers. Jan. 29.

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., Jan, 8, 1903 Sealed proposals for dredging in Calumet River, Ill., will be received here until 12 noon, February 10, 1903, and then publicly opened. Information on application. O. H ERNST, Lieut.-Col. Engineers. Feb. 5.

U. S. Engineer Office, Grand Rapids, Mich., Feb. 2, 1903. Sealed proposals for repair of piers at Pentwater and White Lake, Mich , and repair of piers and revetment at Charlevoix, Mich., will be received here until 3 p.m., March 4, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt., Engrs. Feb. 26.

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for building crib piers, crib breakwater, pile revetment, removal of portion of old pier, and dredging at Waukegan Harbor, Ill , will be received here until 3 o'clock, p. m., March 2, 1903, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office. J. G. WARREN, Major, Engineers. Feb 26.

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for furnishing Oregon fir timber and plank will be received here until 3 o'clock, p. m., March 2, 1903, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office, J. G. WARREN, Major, Engineers Feb. 26.

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for building crib piers at Sheboygan Harbor, Wis., will be received here until 3 o'clock, p. m., March 2, 1903, and then publicly opened. Information furnished on application. J. G. WARREN, Major, Engineers. Feb. 26.

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for building crib breakwater at Manitowoc Harbor, Wis., will be received here until 3 o'clock, p. m., March 2, 1903, and then publicly opened. Information furnished on application. J. G. WARREN, Major, Engineers. Feb. 26.

U. S. Engineer Office, Milwaukee, Wis., Jan. 31, 1903. Sealed proposals for dredging and rock removal at Sturgeon Bay and Lake Michigan Ship Canal, Wis., will be received here until 3 o'clock, p. m., March 2, 1903, and then publicly opened. Specifications and all available information will be furnished on application to this office, J. G. WARREN, Major, Engineers. Feb. 26.

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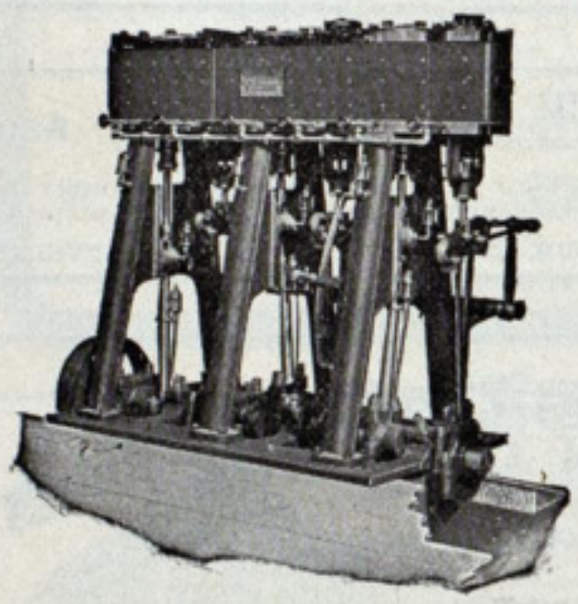

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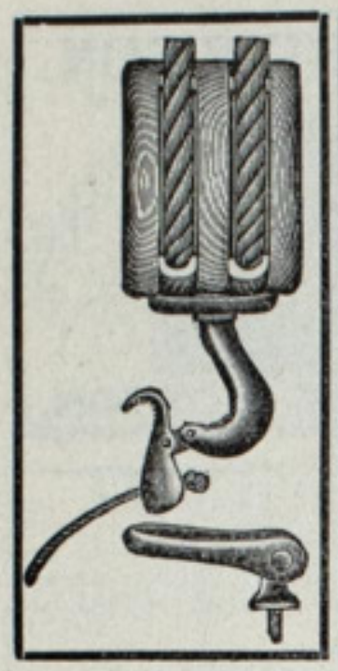

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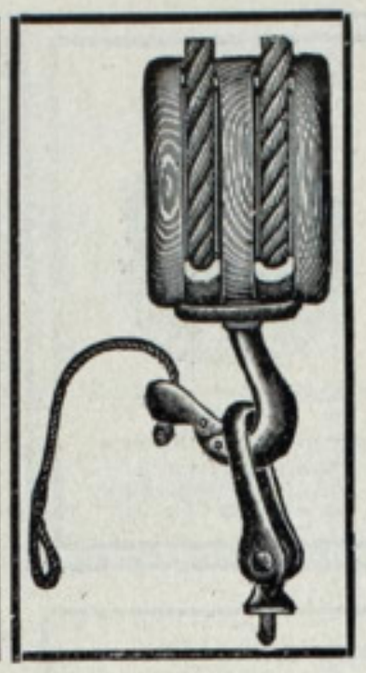

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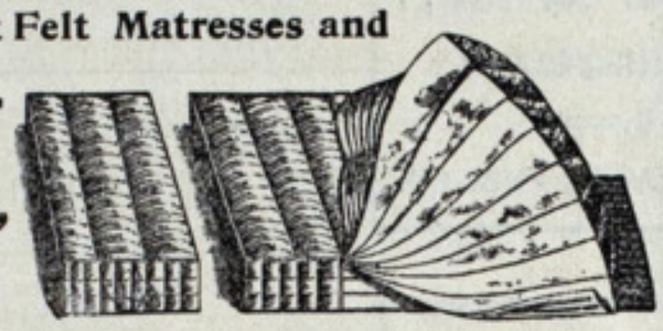

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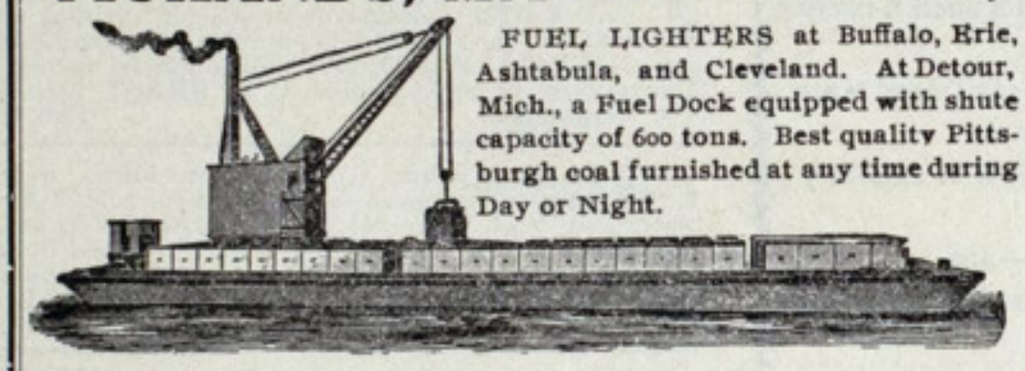

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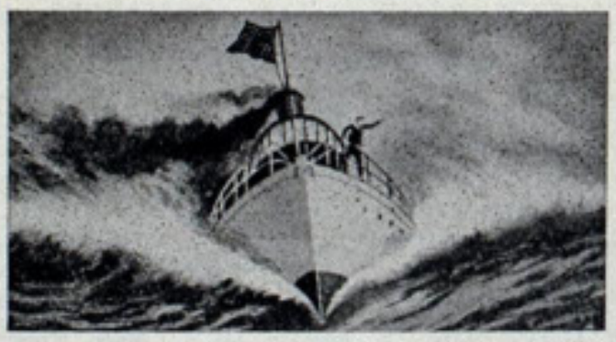

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Schooner Helvetia for sale. Capacity 1,000,000 ft. of lumber or 1,500 tons of ore. Price $12,000. Inquire of H J. Johnson, 1015 Society for Savings, Cleveland, O. Feb 19.

Passenger Steamer and Tug for Sale.

Steamer Ogantz, 80 ft. keel, 18 ft. 8 in. beam, 7 ft. 6 in. draught. Fore and aft compound engine, 14 and 25 by 16 in. Scotch boiler, 10 ft. by 84 in., allowed 125 lbs. steam. Passenger allowance—45 regular and 190 excursion.

Tug Dan Connelley, 65 ft. keel, 16 ft. 6 in. beam. 8 ft. 6 in. draught. Iron boiler 13½ ft. by 76 in., allowed 90 lbs. steam. Double engine, 14x15 in.

These boats were in commission last season and are in good condition. Price reasonable. For particulars address The Sandusky Fish Co., Sandusky, O. tf

Schooner for Sale.

Schooner carrying 150 M. ft. of lumber or 90 cords of maple wood. Will be sold cheap for cash. For full particulars, address Box 37, Marine Review Pub. Co., Cleveland, O. tf

High-Pressure Engine For Sale.

One high pressure engine taken from the steamer Eugene C. Hart. Size 22x 26 in. Will be sold at a bargain. Address Hart Steamboat Line. Green Bay, Wis. tf

Marine Fire Box Boiler For Sale.

Allowed 120 lbs. steam, 15 ft. 6 in. long, 10 ft. dia. Taken out of boat this winter on account of being too small. On the dock at foot of Second street, Bay City. Address O. W. Blodgett, Bay City, Mich. Feb. 19

Schooner For Sale Cheap.

Schooner A. T. Bliss of Chicago, 437 gross tons, length 168 x 30.5 x 10.3; barge rigged; in good shape. Address Browning & Shepard, 139 Hartford Bldg., Chicago. Feb. 5.

Boiler and Engine for Sale.

Both in first-class condition. Boiler 10½ ft. in diameter and 14 ft. long; 120 lbs. steam allowed. Fore and aft compound engine; high-pressure, 22 in. diameter, low-pressure, 44 in., with 36 in. stroke. Address Barry Trans. Co., East End Michigan St., Chicago, Ill. Feb 12.

Tug Wanted.

Wanted to purchase tug about 75 to 80 ft. long, 18 to 20 ft. beam, and 9 to 11 ft. depth; compound engine; good power. Address Powell & Mitchell, Marquette, Mich. tf.

Steamer Wanted.

Wanted—To buy or lease steamer for ferry service at Duluth ship canal, Should accommodate from 300 to 600 passengers. Write and send photograph to Inter State Traction Co., Duluth, Minn. tf.

Steamer Wanted.

Wanted to buy a light draught, stern wheel steamer, about 70 ft. hull, for freight and passenger service. Give full description, price and terms f. o. b. cars. Address Box 39, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O.

Large Tug for Sale.

Large lake tug for sale. In good condition, fitted out for raft towing. Inquire, Frank Perry, Sault Ste. Marie, Mich Mar. 12

Almy Boiler For Sale.

One Class D. boiler of Almy type, rated 62 H. P., having 15½ sq. ft. of grate surface and 600 ft. of heating surface. Dimensions; 58½ in. wide, 58½ in. long, and 81 in. high. Complete trycock, check valve, blow-off valve and consolidated safety valve. This boiler tested with 600 lbs. hydrostatic pressure; working pressure 330 lbs.; insured at this pressure. For further information and price address, Box 38, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland O.

Fish Tug for Sale.

For Sale—Fish Tug Alice, 70 ft. over all; engine 13x14; allowed 120 lbs. steam. Built in 1891; upper works rebuilt in 1902. A good fast boat cheap. Reason for selling—dissolving partnership. Address A. Fountaine Co., Two Rivers, Wis. Feb. 12.

Steamer For Sale.

For sale at a bargain, steamer Cambria, a-Canadian boat, 206 ft. long and 40 ft. beam, fitted with feather dip paddles, electric lighting plant; fully equipped with all sailing appliances; used for both passenger and freight purposes. Will sell for $3,000.00 Address, Frank Lenahan & Son, 53 Fulton St., Buffalo, N. Y. tf.

Two Tugs For Sale.

Tug John Johnson—Engine 20½x22; boiler allowed 120 lbs. steam. Tug Warwick—Engine 15 by 17; boiler allowed 110 lbs. steam. Both boats, engines and boilers practically new and in first-class condition. Boats can be seen at Toledo any time. Cheap for cash. Enquire of James Rooney, 1118 Collingwood Ave., Toledo, O. tf

For Sale.

Steamer Aztec and schooner Miztec. Carrying capacity—Aztec 1,100 tons ore, Miztec 1,500 tons ore. Laid up at Toledo, O. Address C. H. Burchinal, 210 Valentine Bldg., Toledo, O. Mar 8

FOR SALE.

STEAMBOAT ENGINES.

Two pair 7 x 9 double cylinder vertical reversible **steam engines** of the Crane elevator engine style. Send for blue print, photos and price. Also **pumps, condensers** and **small engines for electric lights.**

CLYDE MACHINE WORKS

33d St. and Shields Ave. - Chicago, Ill.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review and Marine Record, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Chicago Pneumatic Tool Co.....Chicago.
"Long Arm" System Co.....Cleveland.

AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co.....Quincy, Mass.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
Bowers, L. M. & Co. .....Binghamton, N. Y.
DeGrauw, Aymar & Co. .....New York.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.
Hardy, Wm. A.....Fitchburg, Mass.
Phosphor Bronze Smelting Co., Ltd....Philadelphia.
Pittsburg White Metal Co. .....Pittsburg, Pa.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

ASBESTOS.

Johns-Manville Co., H. W.....New York.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Bacon, H. H.....Buffalo.
Brown, Harvey L.....Buffalo.
Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Kremer, C. E. .....Chicago.
MacDonald, Ray G.....Chicago.
McPherson, Clark, Campbell & Jarvis.....Toronto.
Pinney & Warner.....Cleveland.
Shaw, Warren, Cady & Oakes.....Detroit.
Spencer, H. R.....Duluth.
White, Johnson, McCaslin & Cannon.....Cleveland.

BANKERS.

Fahey & Co.....Cleveland.
Federal Trust Co. .....Cleveland.
Cleveland Trust Co.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.
Coe, Almer.....Chicago.
Ritchie, E. S. & Sons.....Brookline, Mass.

BELTING, RUBBER.

New York Belting & Packing Co.....New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co., ...Mariner's Harbor, S. I., N. Y.
Marine Iron Works.....Chicago.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bath Iron Works, Ltd.....Bath, Me.
Boyer's Sons, L.....New York.
Chicago Ship Building Co.....Chicago.
Clyde Machine Works. .....Chicago
Cramp, Wm. & Sons.....Philadelphia.
Dearing Water Tube Boiler Co.....Detroit
Delaunay Belleville & Co.....St. Denis, France.
Detroit Shipbuilding Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Harlan & Hollingsworth Co.....Wilmington, Del.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works..Oswego, N. Y.
Lake Erie Boiler Works.....Cleveland.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Mosher, Chas. D.....New York.
Neafie & Levy Ship & Engine Building Co...Phila.
Newport News Ship Building Co..Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roberts Safety Water Tube Boiler Co...New York.
Stirling, The Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.
Trigg, Wm. R Co.....Richmond, Va.
Union Machine & Boiler Co.....Cleveland.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co .....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER COVERING.

Johns-Manville Co., H. W.....New York.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co. .....Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons .....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Macbeth Iron Co.. .....Cleveland
Phosphor Bronze Smelting Co. .....Philadelphia.

BRASS—SHEET, ROD, ETC.

Waterbury Brass C .....New York.

BRASS WORK, MARINE.

Farnan Brass Works .....Cleveland.

BRIDGES, BUILDERS OF

Scherzer Rolling Lift Bridge Co. .....Chicago.

BUCKETS, ORE AND COAL.

Bartlett & Snow Co., C. O. .....Cleveland.
Brown Hoisting & Conveying Machine Co. Cleveland.
Lake Erie Boiler Works.....Cleveland.
Webster, Camp & Lane Co.....Akron, O.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co. .....Bath, Me.

CAST IRON PIPE.

Wood & Co., R. D. .....Philadelphia.

CEMENT, IRON, FOR REPAIRING LEAKS.

Smooth-On Mfg. Co. .....Jersey City, N. J.

CHAINS.

Lebanon Chain Works.....Lebanon, Pa.
Standard Chain Co. .....Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co. .....Boston, Mass.
Dake Engine Co,.....Grand Haven, Mich.

CHARTS.

Marine Review Pub. Co .....Cleveland
Potter, J. D.....London

CIRCULATOR, EQUILIBRIUM,

With Steam Heating Attachment.

Bloomsburg & Co., H. .....Baltimore, Md.

CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co. .....Boston.
Bliss, John & Co. .....New York.
Chelsea Clock Co. .....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt .....Boston.
Graham Coal & Coke Co., Ltd.....Detroit
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.
Pittsburg Coal Co. .....Cleveland.
Rochester & Pittsburg Coal & Iron Co. ....Buffalo.

COAL AND ORE HANDLING MACHINERY.

Bartlett & Snow Co., C. O. .....Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
Lidgerwood Mfg. Co.....New York.
Webster, Camp & Lane Co.....Akron, O.

COMPASSES.

Bliss, John & Co. .....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

CONDENSER TUBE PACKING.

Allen, Joseph .....Collingswood, N. J.

COPPER, TIN AND SHEET IRON WORK.

Lake Erie Boiler Works.....Cleveland.
McCutcheon, C. H.....Buffalo.
Topky Brothers .....Ashtabula, O.

COPPER—SHEET, TUBES AND ROD.

Waterbury Brass Co.....New York.

CORDAGE.

Baker & Co., H. H.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co. ....Pittsburg, Pa.
Kahnweiler's Sons, D. ....New York.
Lane & DeGroot .....Long Island City, N. Y.

CORRESPONDENCE SCHOOLS.

Chicago Nautical School.....Chicago.

CHAIN CONVEYORS, HOISTS.

Bartlett & Snow Co., C. O. .....Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
Chicago Pneumatic Tool Co. .....Chicago.
General Electric Co. .....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Q. & C. Co. .....Chicago.
Westinghouse Electric & Mfg. Co. .....Pittsburg.

DEAD-LIGHTS, AIR-PORTS, ETC.

"Long-Arm" System Co. .....Cleveland.

DRAWING MATERIALS.

Schwencke, Kirk & Co.....New York.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, A. .....New York.

DRILL PRESSES—DRILLS OF ALL KINDS.

Cleveland Punch & Shear Works Co. ....Cleveland.
Q. & C. Co. .....Chicago.

DRYING APPARATUS.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co. .....Boston.

DRY DOCKS.

American Ship Building Co. .....Cleveland.
Atlantic Works .....East Boston, Mass.
Baltimore Ship Building Dry Dock Co...Baltimore.
Bath Iron Works, Ltd. .....Bath, Me.
Buffalo Dry Dock Co. .....Buffalo.
Chicago Ship Building Co. .....Chicago.
Craig Ship Building Co. .....Toledo, O.
Cramp, Wm. & Sons .....Philadelphia.
Detroit Ship Building Co. .....Detroit.
Harlan & Hollingsworth Co. ....Wilmington, Del.
Lockwood Mfg. Co. .....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Marine Construction & Dry Dock Co. ....New York.
Maryland Steel Co. .....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co. .....Wilmington, Del.
Shipowners Dry Dock Co. .....Chicago.
Superior Ship Building Co.....Superior, Wis.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co. ..Pittsburg, Pa.

ELECTRIC FIXTURES AND APPLIANCES.

General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co. .....Buffalo.
Electro-Dynamic Co. .....Philadelphia.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co.....Detroit.
Sturtevant, B. F. Co. .....Boston.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.

Electro-Dynamic Co. .....Philadelphia.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works .....East Boston, Mass.
Bath Iron Works, Ltd. .....Bath, Me.
Bell Engineering Works, David .....Buffalo.
Buffalo Forge Co. .....Buffalo.
Chicago Ship Building Co.....Chicago.
Chase Machine Co. .....Cleveland.
Craig Ship Building Co. .....Toledo, O.
Cramp, Wm. & Sons .....Philadelphia.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co. .....Detroit
Fletcher, W. & A. Co. .....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros. .....Philadelphia.
Harlan & Hollingsworth Co. ....Wilmington, Del.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co. .....East Boston, Mass.
MacKinnon Mfg. Co. .....Bay City, Mich.
Maryland Steel Co. .....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Mosher, Chas. D. .....New York.
Neafie & Levy Ship & Engine Bldg. Co. Philadelphia.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roach's Ship Yard .....Chester, Pa.
Thropp, J. E. & Sons Co. .....Trenton, N. J.
Sheriffs Mfg. Co. .....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G. .....Buffalo.
Warrington Iron Works .....Chicago.
Willard, Chas. P. & Co. .....Chicago.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son .....New York.
Electro-Dynamic Co. .....Philadelphia.
MacLean Hydraulic Signal Co.....Chicago.
Seidler-Miner Electric Co. .....Detroit.

ENGINEERING BOOKS.

Audel & Co., Theo.....New York.
Marine Review Pub. Co.....Cleveland.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co. .....Chicago.
Farnan Brass Works .....Cleveland.
Kieley & Mueller .....New York.
McCutcheon, C. H. .....Buffalo.
New York Belting & Packing Co.....New York.
Reilly Repair & Supply Co., James.....New York.

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Goodenough, Walter .....New York.
Hunt, Robt. W. & Co. .....Chicago.
Kidd, Joseph .....Duluth, Minn.
Logan, Robert .....Cleveland.
Mosher, Chas D. .....New York.
Newman, R. L.....New York.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.
Powell, Ambrose V. .....Chicago.
Roelker, H. B. .....New York.
Sadler, Perkins & Field.....New York.
See, Horace .....New York.
Wood, W. J. .....Chicago.

EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James....New York.

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Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co. .....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert .....Buffalo.
Reilly Repair & Supply Co., James.....New York.
Ross Valve Co. .....Troy, N. Y.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

FORGES.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co. .....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co. .....Cleveland.
Fore River Ship & Engine Co. .....Quincy, Mass.
Macbeth Iron Co. ..... Cleveland.

FLUE WELDING.

Fix's, S. Sons .....Cleveland.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.

Castner, Curran & Bullitt (Pocahontas) ....Phila.
Graham Coal & Coke Co.....Detroit
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.
Pittsburg Coal Co. .....Cleveland.
Rochester & Pittsburg Coal & Iron Co. ....Buffalo.
Smith, Stanley B. & Co. .....Detroit.
Youghiogheny & Lehigh Valley Coal Co...Chicago.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co. ..New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co. .....Cleveland.

GAGES, STEAM AND VACUUM.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.

GRAPHITE.

Dixon Crucible Co., Joseph .....Jersey City, N. J.

HAMMERS, STEAM.

Bell Engineering Works, David .....Buffalo.
Chase Machine Co. .....Cleveland.
Q. & C. Co. .....Chicago.

HARDWARE, SHIP.

Topky Brothers .....Ashtabula, O.

HATCH GEARS.

"Long-Arm" System Co. .....Cleveland.

HEATING APPARATUS.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co. .....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co., Inc. ....Cleveland.
Chase Machine Co. .....Cleveland.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....New York.
Hyde Windlass Co. .....Bath, Me.
Lidgerwood Mfg. Co.....New York.
Marine Iron Co. .....Bay City.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE FITTINGS.

Farnan Brass Works. .....Cleveland.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC MACHINERY.

Watson-Stillman Co., The.....New York.
Wood & Co., R. D. .....Philadelphia.

ICE MACHINERY.

American Linde Refrigerating Co. .....New York.
Roelker, H. B. .....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.

INJECTORS.

American Injector Co. .....Detroit
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co. .....Cincinnati.
Penberthy Injector Co. .....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co. .....Buffalo.
Brown, W. W. .....Cleveland.
Dunham, R. J. .....Chicago.
Elphicke, C. W. & Co. .....Chicago.
Hawgood & Co., W. A. .....Cleveland.
Helm & Co., D. T. .....Duluth
Hutchinson & Co. .....Cleveland.
Insurance Co. of North America....Philadelphia
McCarthy, T. R. .....Montreal.
McCurdy, Geo. L. .....Chicago.
Mitchell & Co. .....Cleveland.
Peck, Chas. E. & W. F. ...New York and Chicago.
Richardson, W. C. .....Cleveland.
Sullivan, D. & Co. .....Chicago.
Weeks, F. H. .....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co. .....Cleveland.
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Warrington Iron Works .....Chicago.
Willard, Chas. P. .....Chicago.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co. .....Pittsburg.
Drein, Thos. & Son .....Wilmington, Del.
Kahnweiler's Sons, D. .....New York.
Lane & DeGroot .....Long Island City, N. Y.
Marine Construction & D. D. Co, Mariner's Harbor,.....S. I. N. Y.

LIGHTS, SIDE AND SIGNAL.

Helvig, H. A. J.....New York.
Russell & Watson .....Buffalo.

LOGS.

Walker & Sons, Thomas .....Birmingham, Eng.
Nicholson Ship Log Co. .....Cleveland.
Also Ship Chandlers.

MACHINISTS.

Chase Machine Co.....Cleveland.
Macbeth Iron Co. .....Cleveland.
Union Machine & Boiler Co.....Cleveland.
Ward Machine Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc. .....Philadelphia.

MACHINERY, NEW AND SECOND HAND.

Bowler & Co. Geo. H. .....Cleveland.
Clyde Machine Works.....Chicago.

MAN-HOLES, SWING DOORS, ETC.

"Long-Arm" System Co. .....Cleveland.

MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I. .....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co. .....Cleveland
Bloomsburg & Co., H. .....Baltimore, Md.
Buffalo Forge Co. .....Buffalo.
Detroit Ship Building Co. .....Detroit.
Sturtevant, B. F. Co. .....Boston.

METALLIC PACKING.

Allen, Joseph .....Collingswood, N. J.
Hayden Mfg. Co., N. L. .....Columbus, O.
Katzenstein, L. & Co. .....New York.
U. S. Metallic Packing Co. .....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co. .....Boston.

MOTORS, GENERATORS—ELECTRIC.

Buffalo Forge Co. .....Buffalo.
Electro-Dynamic Co. .....Philadelphia.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
"Long-Arm" System Co. .....Cleveland.
Seidler-Miner Electric Co. .....Detroit.
Sturtevant, B. F. Co. .....Boston.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co. .....New York.
Ritchie, E. S. & Sons .....Brookline, Mass.

NAVAL ARCHITECTS.

Gaskin, Edward .....Buffalo.
Goodenough, Walter .....New York.
Kidd, Joseph .....Duluth, Minn.
Logan, Robert .....Cleveland.
Mosher, Chas. D. .....New York.
Newman, R. L. .....New York.
Sadler, Perkins & Field.....New York
See, Horace.....New York.
Wood, W. J. .....Chicago.

OAKUM.

DeGrauw, Aymar & Co. .....New York.
Stratford Oakum Co.,.....Jersey City, N. J.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph .....Jersey City, N. J.
Standard Oil Co. .....Cleveland.

OIL FILTERS.

Haines Co., W. S. .....Philadelphia.

PACKING.

Allen, Joseph .....Collingswood, N. J.
Crane Co. .....Chicago.
Hayden Mfg. Co., N. L. ..... Columbus, O.
Jenkins Bros. .....New York.
Katzenstein, L. & Co. .....New York.
New York Belting & Packing Co.....New York.
United States Metallic Packing Co. ....Philadelphia.

PAINTS.

Baker, Howard H. & Co. .....Buffalo.
Berry Bros., Ltd. .....Detroit.
Day's Varnish & Dryer Co. .....Cleveland.
Mohawk Paint & Chemical Co. .....New York.
New Jersey Zinc Co. .....New York.
Topky Brothers .....Ashtabula, O.
Upson-Walton Co. .....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates .....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PIPE—BRASS AND COPPER, IRON PIPE SIZE.

Waterbury Brass Co.....New York.

PIPE, WROUGHT IRON.

Bourne-Fuller Co .....Cleveland.
Crane Co .....Chicago.
Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PLATE BENDING AND PLANING MACHINES.

Wood & Co., R. D. .....Philadelphia.

PLUMBING, MARINE.

Mott, J. L., Iron Works .....New York.
Reilly Repair & Supply Co., James....New York.
Sands, Alfred B. & Son .....New York.

PNEUMATIC TOOLS.

Allen, John F., ... New York.
Chicago Pneumatic Tool Co. .....Chicago.
Q. & C. Co. .....Chicago.

POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.

POWER DOORS AND HATCHES.

"Long-Arm" System Co. .....Cleveland.

PRESSURE REGULATORS.

Kieley & Mueller .....New York
Ross Valve Co. .....Troy, N. Y.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PROPELLER WHEELS.

American Ship Building Co. .....Cleveland
Atlantic Works .....East Boston, Mass.
Baltimore Ship Building & Dry Dock Co. Baltimore.
Bath Iron Works, Ltd. .....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Hyde Windlass Co. .....Bath, Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co. .....East Boston, Mass.
Macbeth Iron Co..... Cleveland.
MacKinnon Mfg. Co. .....Bay City, Mich.
Maryland Steel Co. .....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Phila.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roelker, H. B. .....New York.
Sheriffs Mfg. Co. .....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp & Sons Co., J. E. .....Trenton, N. J.
Trigg, Wm. R. Co. .....Richmond, Va.
Trout, H. G. .....Buffalo.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co. .....New York.
Clyde Machine Works..... .....Chicago.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Wks, Oswego, N. Y.

PUNCHES, RIVETERS, SHEARS.

Chicago Pneumatic Tool Co. .....Chicago.

REFRIGERATING APPARATUS.

Roelker, H. B. .....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register .....Cleveland.
Record of American & Foreign Shipping.New York.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co. New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. .....Cleveland.

RANGES.

Russell & Watson .....Buffalo.

RIVETS—BRASS AND COPPER.

Waterbury Brass Co.....New York.

RUBBER INSULATED WIRES.

Roebling's Sons, Jno. A...New York and Cleveland.

SAFETY VALVES.

American Steam Gauge Co. .....Boston.
Ashton Valve Co.....Boston.
Hayden Mfg. Co., N. L..... Columbus, O.
Lunkenheimer Co. .....Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co. .....Buffalo.
Upson-Walton Co. .....Cleveland.
Wilson & Silsby .....Boston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS—NAUTICAL, ENGINEERING.

Buffalo Com. & Electro-Mechanical Inst...Buffalo.
Chicago Nautical School .....Chicago.

SEARCH LIGHTS.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. .....Cleveland.

SHIP BUILDERS.

American Ship Building Co. .....Cleveland.
Atlantic Works .....East Boston, Mass.
Baltimore Ship Building & Dry Dock Co..Baltimore.
Bath Iron Works, Ltd.....Bath, Me.
Bell Engineering Works, David .....Buffalo.
Buffalo Dry Dock Co. .....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co. .....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Harlan & Hollingsworth Co. .....Wilmington, Del.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.
Maryland Steel Co .....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Phila.
Newport News Ship Bldg. Co....Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roach's Ship Yard .....Chester, Pa.
Smith & Son, Abram .....Algonac, Mich.
Superior Ship Building Co.....Superior, Wis.
Trigg, Wm. R. Co. .....Richmond, Va.
Warrington Iron Works .....Chicago.
Willard, Chas. P. & Co. .....Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co. .....Buffalo.
Moran Bros. Co. .....Seattle, Wash.
Reilly Repair & Supply Co., James....New York.
Upson-Walton Co. .....Cleveland.

SHIP LANTERNS AND LAMPS.

Helvig, H. A. J.....New York.
Page Bros. & Co.....New York.
Russell & Watson.....Buffalo.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. .....Jersey City, N. J.

SPARS—LARGE SIZES.

Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co.....New York.
Holmes, Samuel.....New York.
King, Rufus S.....New York.
McCarthy, T. R.....Montreal, Can.
Newman, R. L.....New York.
Weeks, F. H.....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
International Nav. Co.....Philadelphia.
Pere Marquette R. R. & S. S. Line.....Milwaukee.
Red Star Line.....New York.

STEEL CASTINGS.

Seaboard Steel Casting Co.....Chester, Pa.
Macbeth Iron Co..... Cleveland.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
Chase Machine Co. .....Cleveland.
Dake Engine Co.....Grand Haven, Mich.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriff Mnfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.

Brown, W. W.....Cleveland.
Fahey & Co.....Cleveland.

SUBMARINE DIVING APPARATUS

Morse & Son, A. J.....Boston.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.

Goodenough, Walter.....New York.
Gaskin, Edward.....Buffalo.
Newman, R. L.....New York.
See, Horace.....New York.
Wood, W. J.....Chicago.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co.....New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F. .....New York.
Chicago Pneumatic Tool Co.....Chicago.
Q. & C. Co.....Chicago.
Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.
Sincennes-McNaughton Line, Ltd....Montreal, Can.

TRAPS, STEAM.

Haines Co., Wm. S.....Philadelphia.
Kieley & Mueller.....New York.

TRUCKS.

Boston & Lockport Block Co..... .....Boston.

TUBING, SEAMLESS.

Benedict & Burnham Mnfg. Co....Waterbury, Conn.
National Tube Co.....Pittsburg.
Waterbury Brass Co.....New York.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Crane Co. .....Chicago.
Farnan Brass Works .....Cleveland.
Hayden Mfg. Co., N. L..... .....Columbus, O.
Jenkins Bros.....New York.
Kieley & Mueller.....New York.
Lunkenheimer Co.....Cincinnati.
Ross Valve Co. .....Troy, N. Y.

VALVES FOR WATER AND GAS.

Wood & Co., R. D.....Philadelphia.
Ross Valve Co. .....Troy, N. Y.

VARNISHES.

Berry Brothers, Ltd.....Detroit.
New Jersey Zinc Co.....New York.
Also Ship Chandlers.

VESSEL CASTINGS.

American Ship Building Co..... ..... Cleveland.
Macbeth Iron Co..... .....Cleveland.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Brown, W. W.....Cleveland.
Dunham, R J..... .....Chicago.
Elwell, Jas. W. & Co.....New York.
Elphicke, C. W & Co.....Chicago.
Hall & Root.....Buffalo.
Helm & Co., D. T. ..... Duluth
Hawgood & Co., W. A.....Cleveland.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
King, Rufus S.....New York.
McCarthy, T. R.....Montreal.
Newman, R. L.....New York.
Mitchell & Co.....Cleveland.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Weeks, F. H.....New York.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co.....Boston.

WIRE—BRASS AND COPPER.

Waterbury Brass Co.....New York.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co.....Buffalo.
DeGrauw, Aymar & Co. .....New York
Roebling's Sons John A....New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Farnan Brass Works .....Cleveland.
Lunkenheimer Co.....Cincinnati.

WHITE METAL—SHEETS, RODS AND WIRE.

Waterbury Brass Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co. .....Cleveland
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

YACHT AND BOAT BUILDERS.

Bell Engineering Works, David .....Buffalo.
Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & Dry Dock Co. ...New York.
Truscott Boat Mfg. Co. .....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Williard, Chas. P. & Co.....Chicago.

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Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.

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Photographs of Marine Scenes on the Great Lakes.

Negative size of the following photographs is 7x9 inches. Sent to any address, postpaid at 75 cents each.

ASHTABULA, OHIO.
Harbor Entrance.
L. S. & M. S. Ry. Ore Docks.
L. S. & M. S. Ry. Ore Docks—unloading ore.
L. S. & M. S. Ry. Ore Docks—ore on docks.
Car Dumping Machine, two views.
Fueling Lighter with Clam Shell Hoist.

BUFFALO, N. Y.
Harbor Entrance.
City Ship Canal.
Great Northern Elevator and Shipping.
Great Northern Elevator—unloading grain.
River and Elevators.
River and Elevators, foot of Michigan St.
River and Elevators, foot of Main St.
C. & B. Line Freight Sheds.
Northern Steamship Co.'s Winter Quarters.
"An Old Timer" at C. T. T. Elevator.
Lackawanna Coal Chutes, two views.
Lackawanna Ore Docks—unloading ore.
Lackawanna Ore Docks—unloading ore and loading coal.
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Unloading Wheat into Elevators, two views.

CHICAGO, ILL.
Chicago River Elevators.
Lake Front, from Illinois Central Station.
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Car Dumping Plant, two views.

DETROIT, MICH.
Winter in Detroit River.
Car Ferry turning in ice—two views.
"Michigan Central" entering slip.

DULUTH, MINN.
The Harbor.
The Bluffs.
"Last Trip From Duluth."

ERIE, PA.
Anchor Line Docks and Pennsylvania R. R. Co.'s Ore and Coal Docks.
Pennsylvania E. R. Coal Trestle.
Pennsylvania R. R. Co.'s Docks. Unloading Ore
Hanna's Ore Plant.
Coal Trestle and Car Dumping Plant.

OSWEGO, N. Y.
Coal and Ore Docks.

ST. CLAIR FLATS.
Str. Tashmoo Entering Ship Canal.
A Freighter Leaving Ship Canal.
Lake Vessels Old and New.
Nightfall on the River.
A Lumber Tow.

SAULT STE. MARIE, MICH.
General View of Locks from Offices.
Poe Lock, from below, closed.
Poe Lock, from below, open.
Poe Lock, from above.
Poe Lock, with Whaleback.
Weitzel Lock, from above.
Weitzel Lock, from below.
Str. North-Land Passing Locks, two views.
Upper Entrance to Lock Canal.
Gate Mechanism.
Interior of Power House.
Canadian Lock from Upper End.
Canadian Lock from Lower End.
The Rapids, looking up.
The Rapids, looking across.
Indians fishing in the rapids.

PANORAMIC VIEWS.—7x17 inches at $1.75 each.
Lackawanna Ore Docks—Unloading ore.
American Steel & Wire Co.'s Plant, Cleveland.
Ore Docks and Harbor, Cleveland.
Ore Docks, Cleveland.
Water Front, Detroit, from Windsor.
Coal and Ore Docks at Oswego.

Address: MARINE REVIEW PUB. CO., 39-41 Wade Bldg., Cleveland. Ohio.

WILLIAM L. BROWN, President. B. W. WELLS, Vice-Pres. O. R. SINCLAIR, Sec'y & Treas. ALFRED G. SMITH, Gen'l Supt.

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Ship Yard and Dry Dock Office, "South Chicago 40."
Chicago Office, 1125 Rookery, "Harrison," 1207.

Steel Ship Builders and Dry Dock Proprietors.

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MILWAUKEE, WISCONSIN

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OF ALL KINDS

Two Ship Yards offer every Facility for the Repair of both Steel and Wooden Vessels

South Yard Dock....
is 450 ft. long on keel blocks; 460 feet over all; 56 feet width of gate, and 16 feet over sill.

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312 feet on keel blocks; 45 feet width of gate, and 12 feet over sill.

RUDDER PIT IN EACH DOCK.
ELECTRIC LIGHTS FOR NIGHT WORK.

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No. 22, Lake Shore Lim...	*2:15am	*2:20am
No. 20, Chi & Cleve Ex....	*7:20am	.....
No. 28, N Y & Bost Ex ..	*7:40am	*8:00am
No. 40, Toledo & Buff Ac.	†10:00am	†10:40am
No. 32, Fast Mail	*11:25am	*11:30am
No. 44, Ac via Sandusky..	†1:40pm	..
No. 46, Southwestern Ex.	....	*3:00pm
No. 106, Conneaut Accom	.....	†4:30pm
No. 6, Lim Fast Mail....	*5:40pm	*5:45pm
No. 26, 20th Cent Lim. ...	*7:40pm	*7:43pm
No. 10, C., N Y & B Sp....	*7:30pm	*7:50pm
No. 16, New Eng Ex.....	*10:30pm	*10:35pm
No. 2, Day Express.	†9:10pm	†9 25pm
No. 126, Norwalk Accom.	†7:50am	.....

Westward.	Arrive from East.	Depart West.
No. 11, Southwestern Lim	*3:25am	.....
No. 7, Day Express.....	.....	†6:10am
No. 15, Bost & Chi Sp.....	*3:10am	*3:15am
No. 19, Lake Shore Lim..	*7:15am	*7:20am
No. 23, Western Express.	*10:30am	*10:35am
No. 33, Southern Express	*12:25pm	....
No. 133, Cleve & Det Ex..	....	*12:45pm
No. 47, Accomodation.....	†11.20am	†3:00pm
No. 141, Sandusky Accom.	.....	†3:10pm
No. 43, Fast Mail	*4:35pm	*4:40pm
No. 127, Norwalk Accom..	.....	†5:10pm
No. 37, Pacific Express...	*7:00pm	*7:20pm
No 2, Fast Mail Lim.....	*10:50pm	*10:55pm
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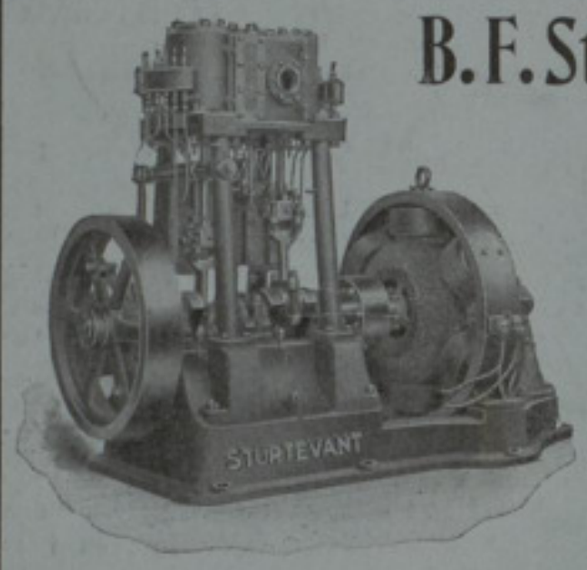

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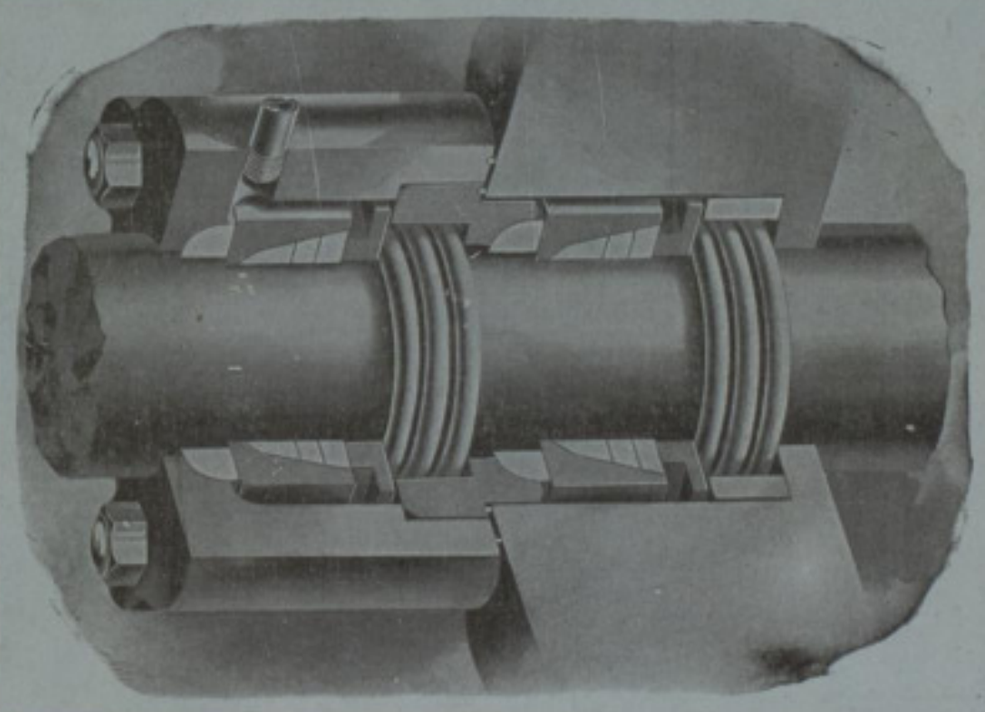

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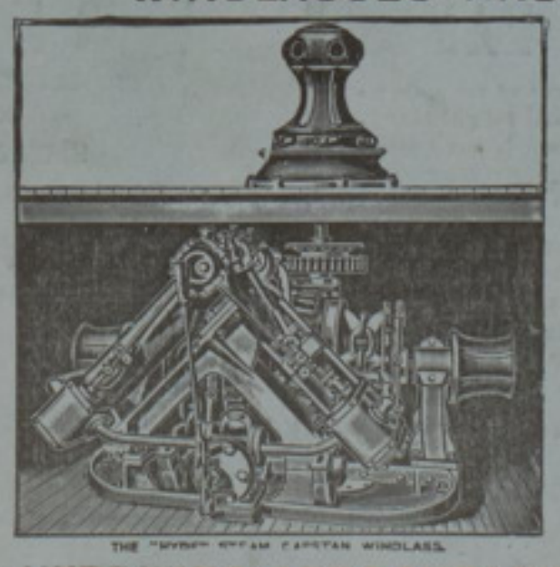

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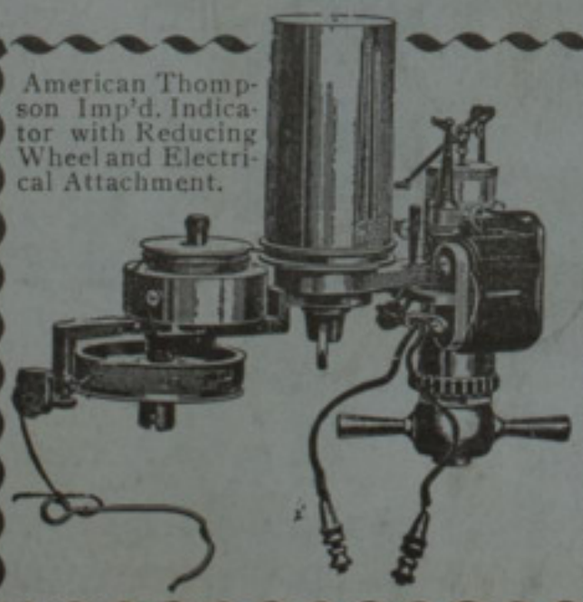

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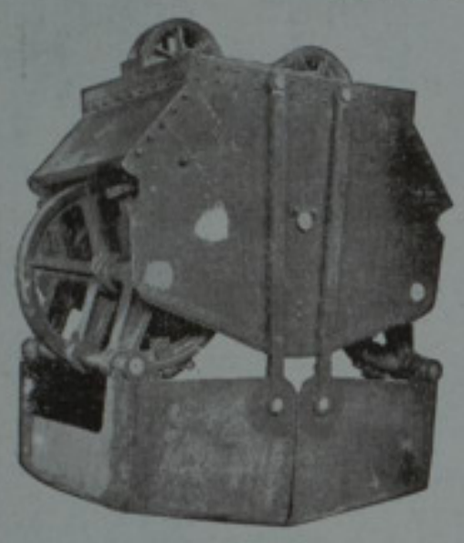

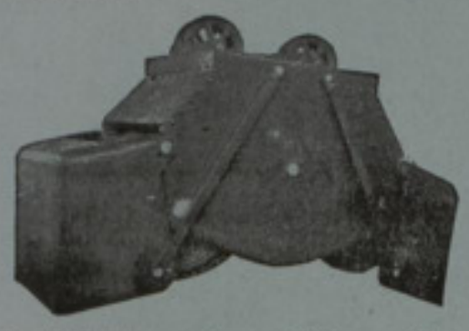

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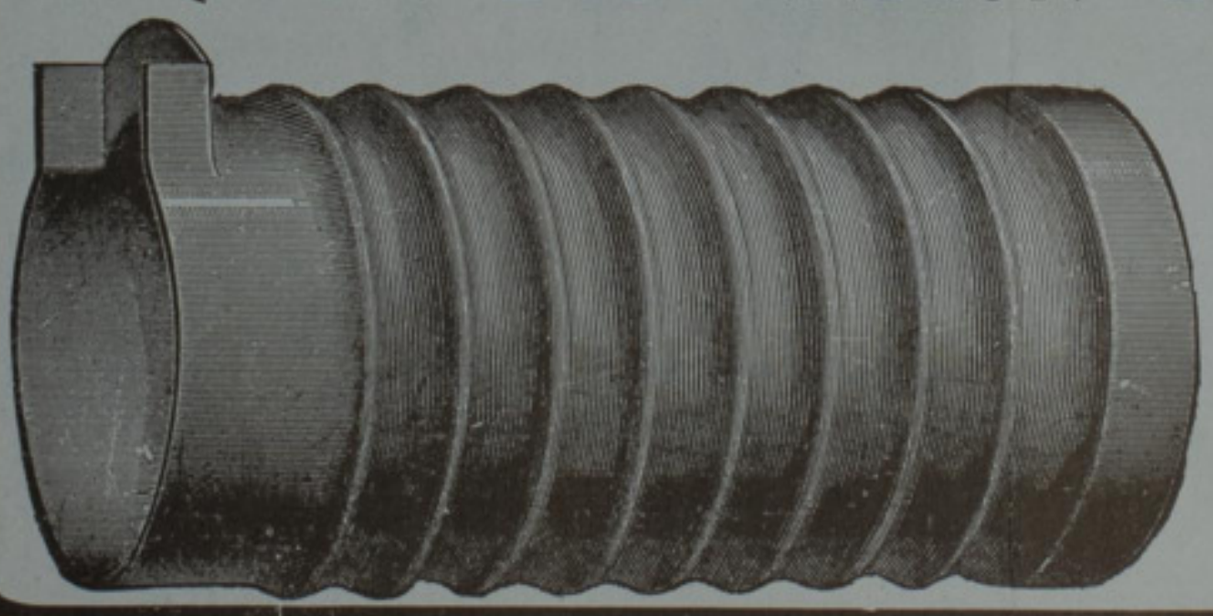

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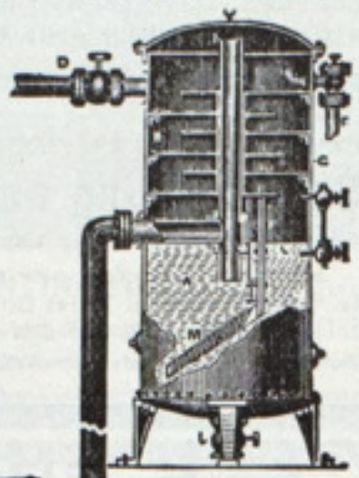

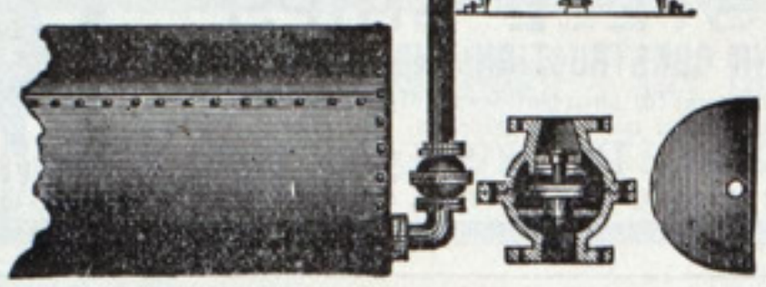

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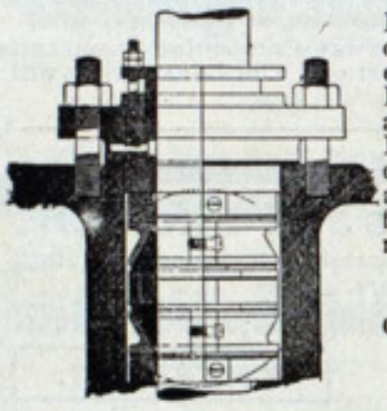

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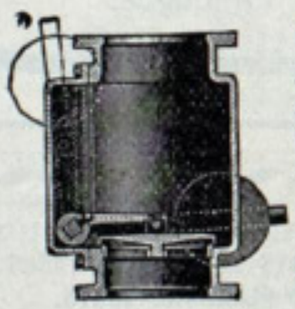

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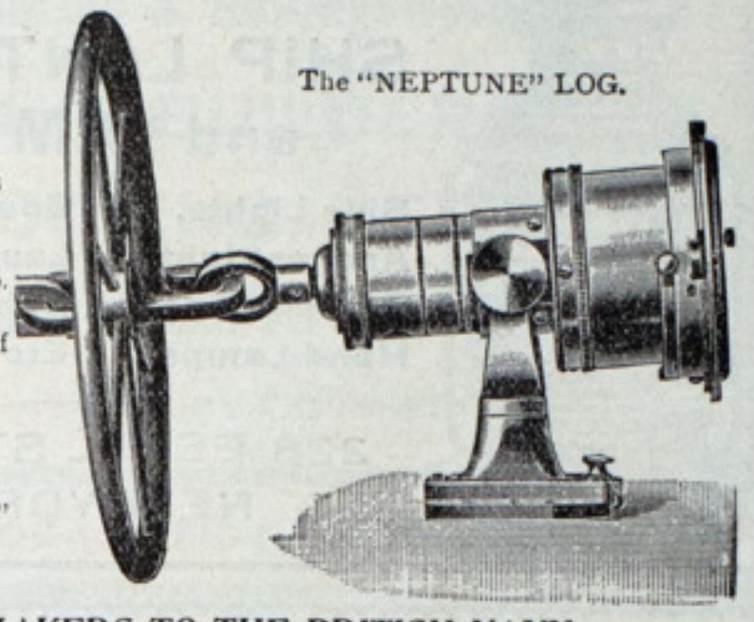

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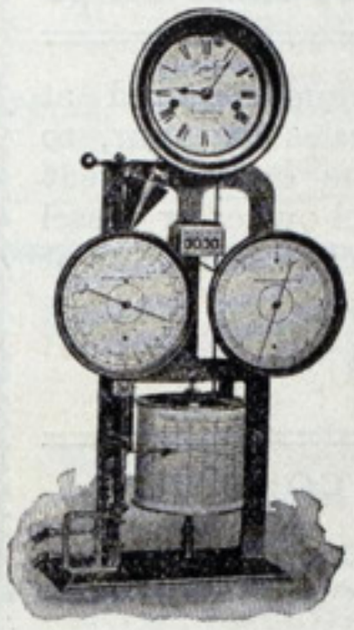

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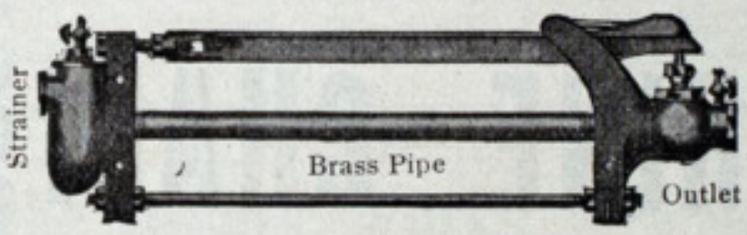

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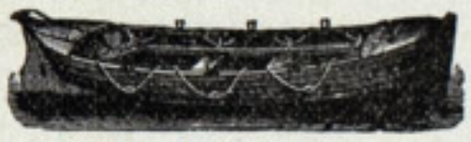

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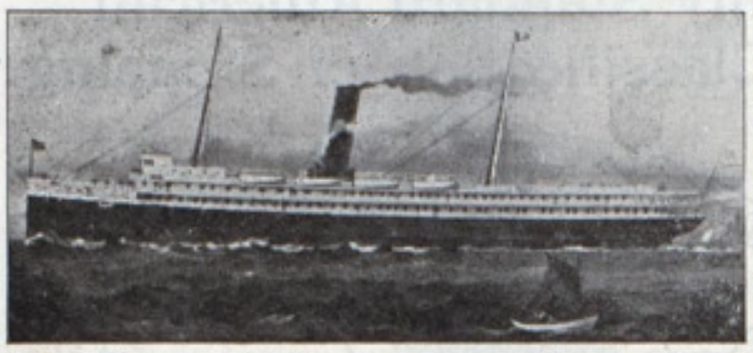

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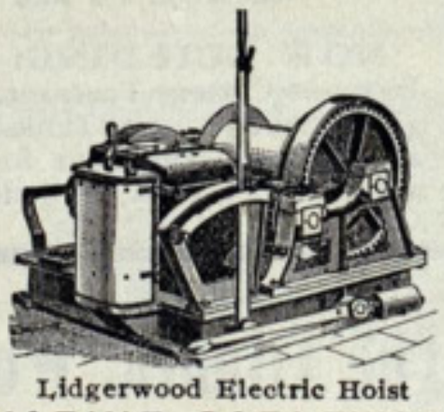

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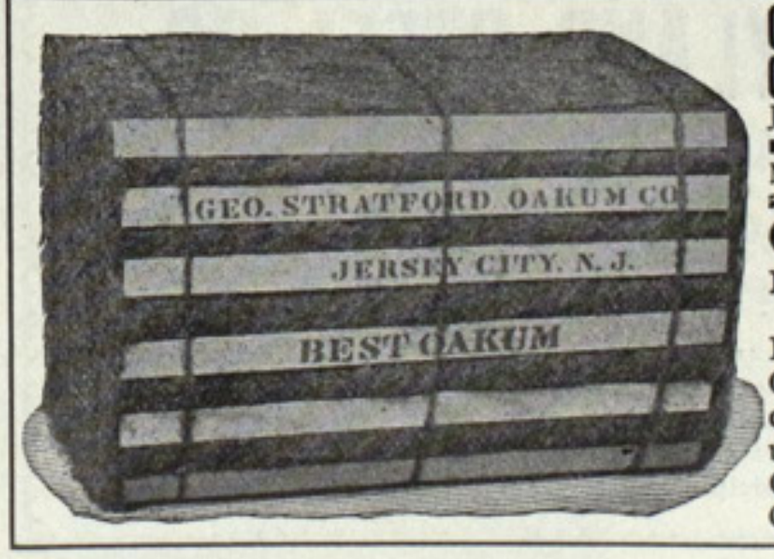

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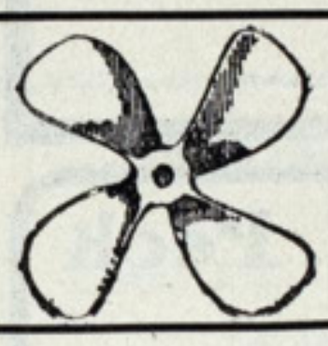

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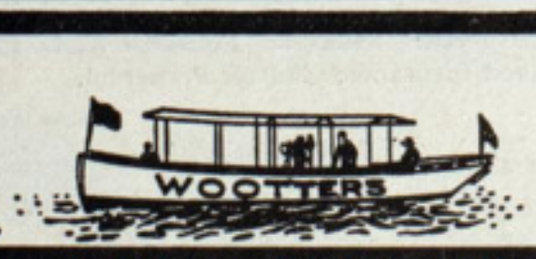

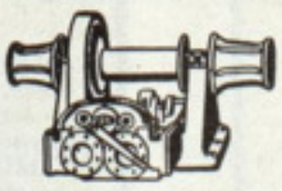

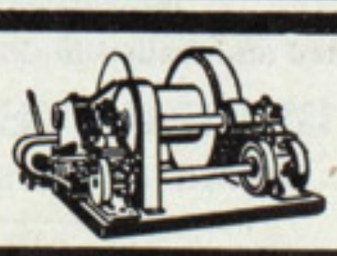

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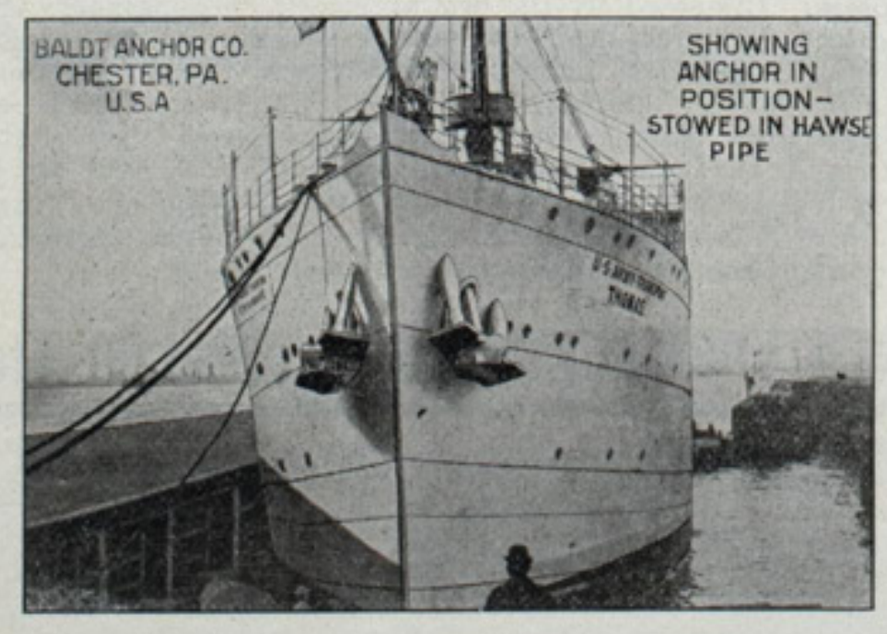

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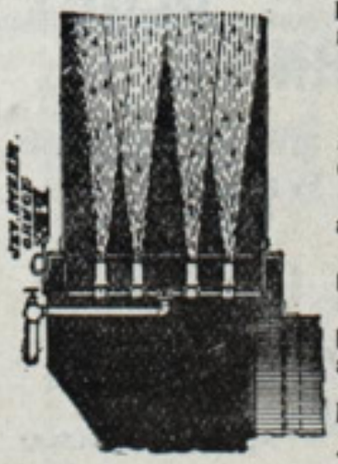

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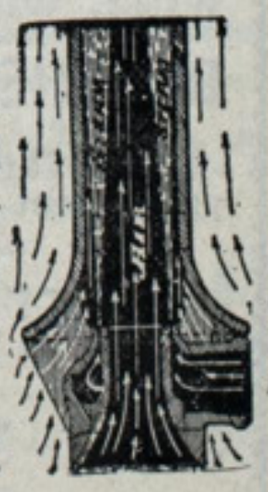

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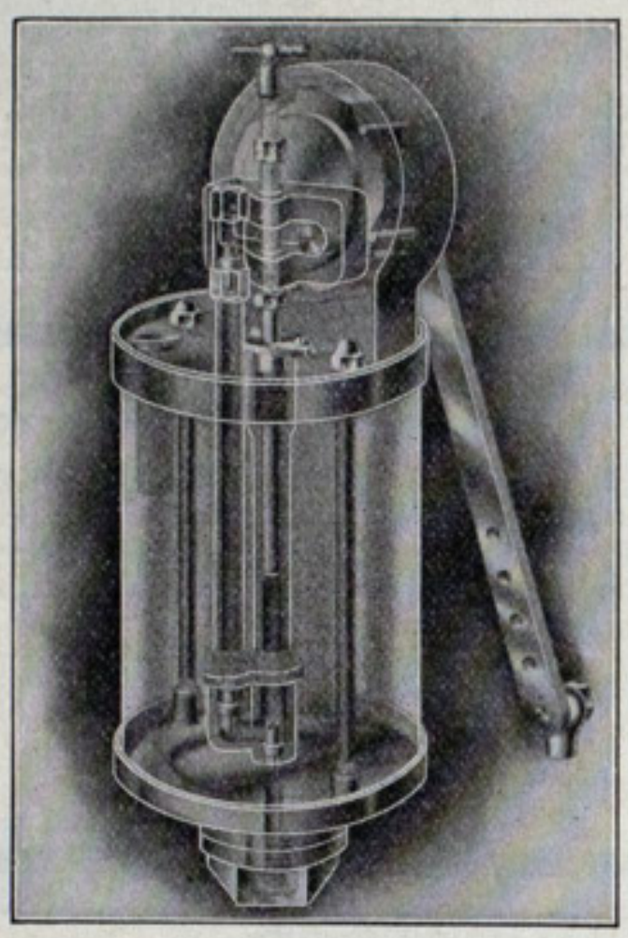

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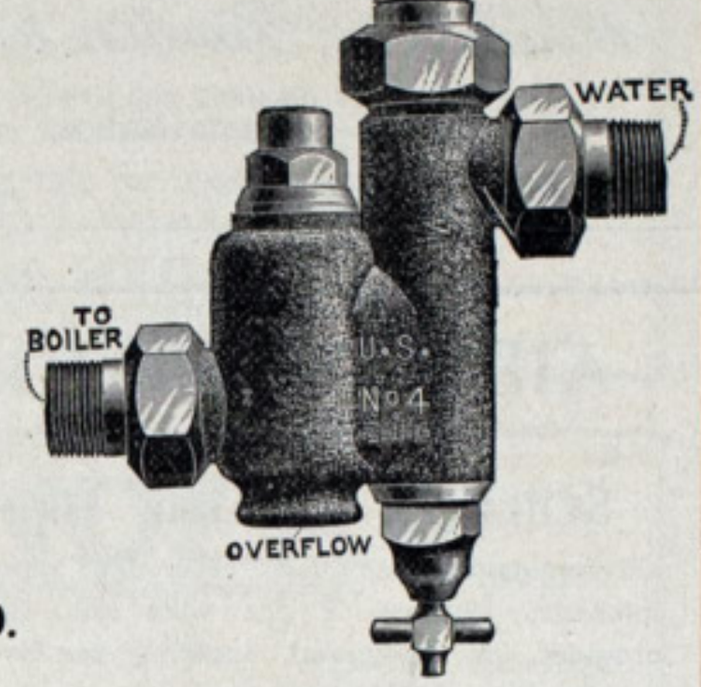

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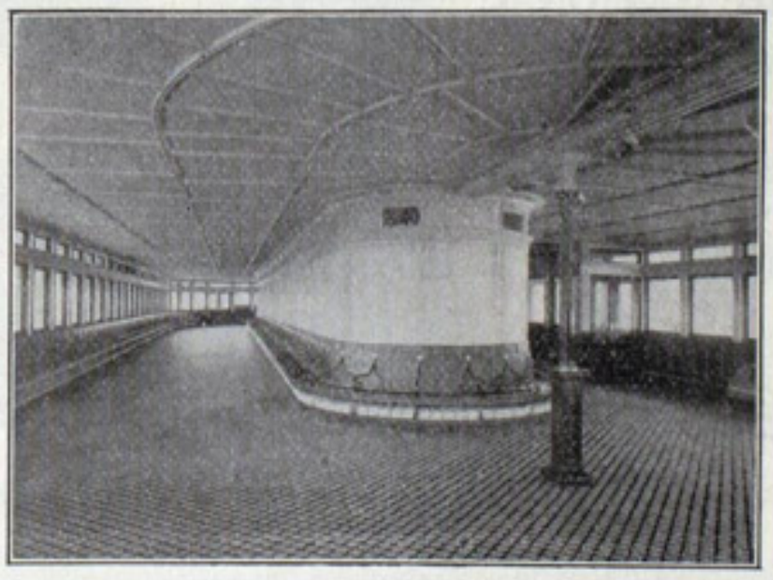

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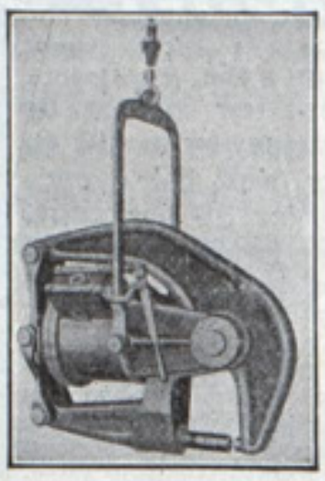

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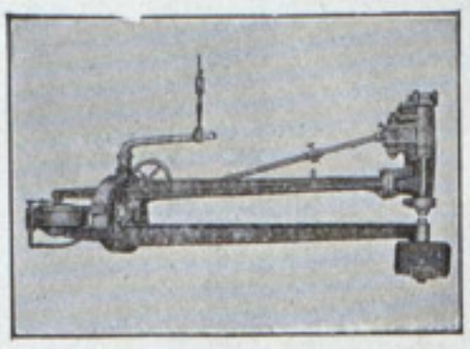

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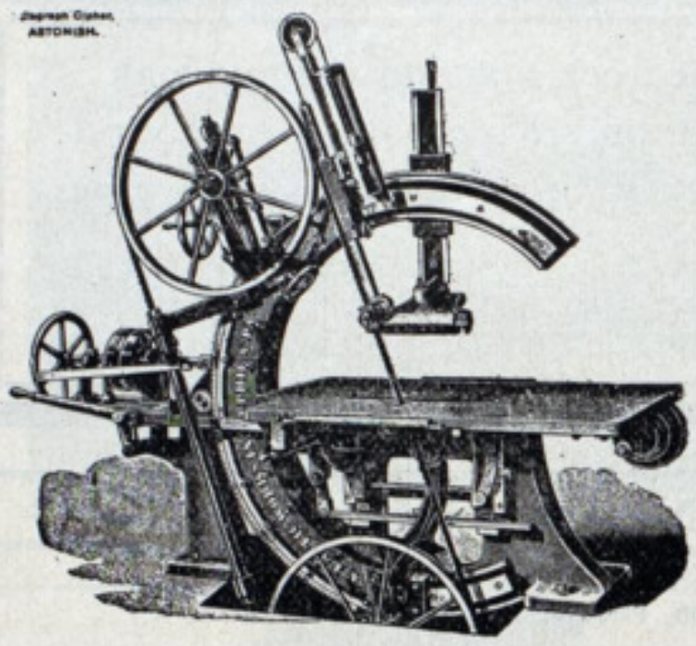

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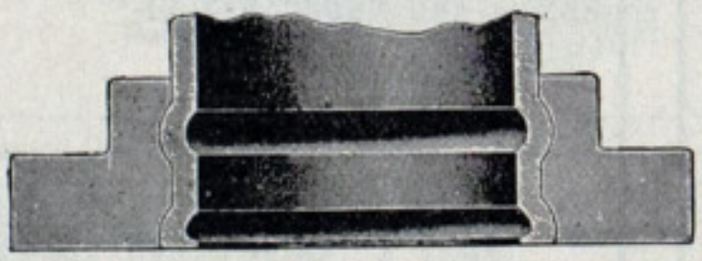

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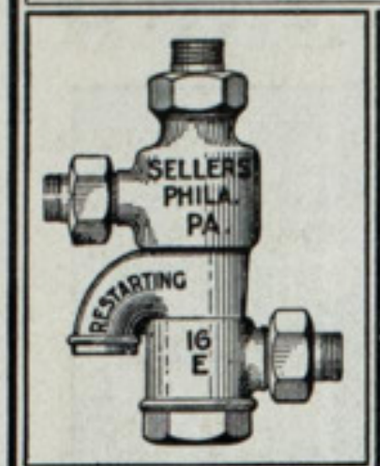

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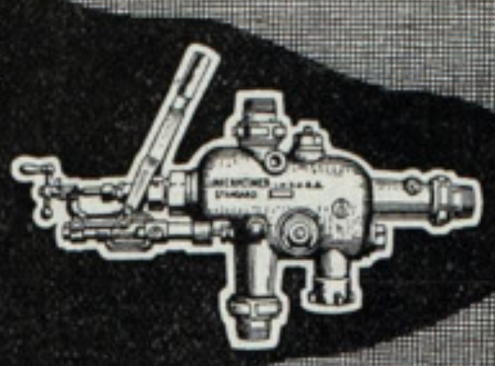

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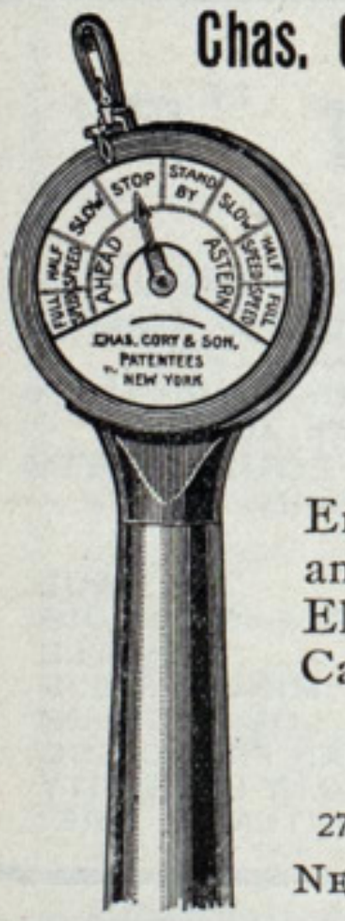

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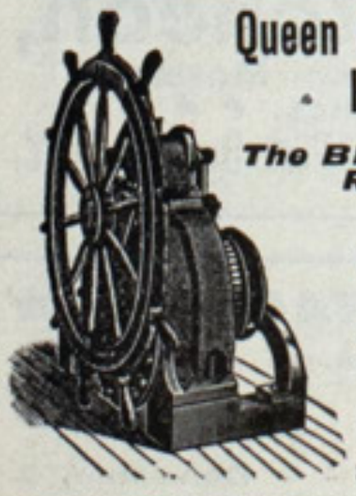

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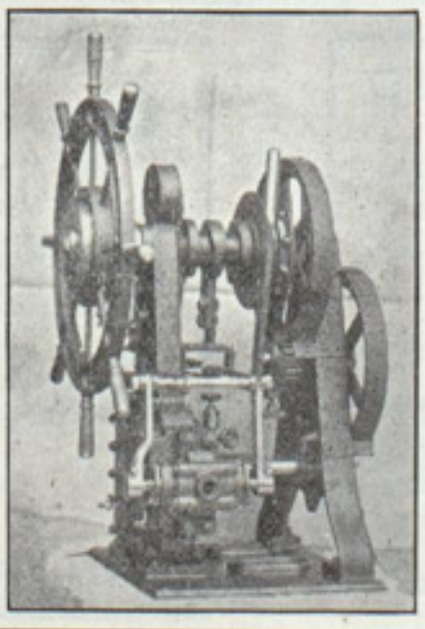

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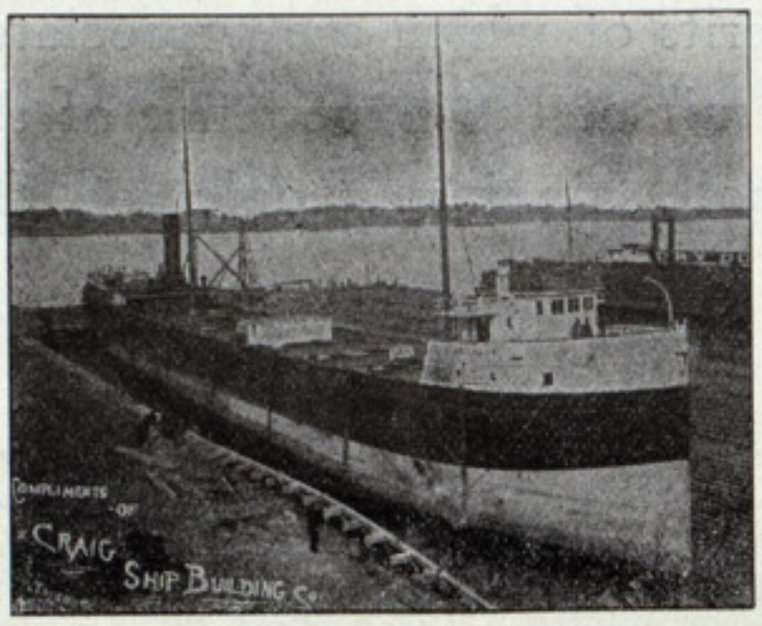

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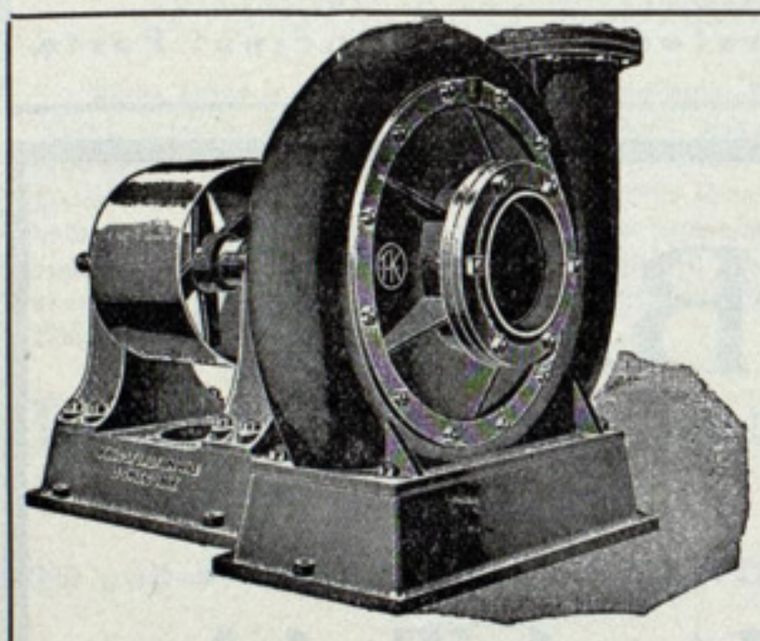

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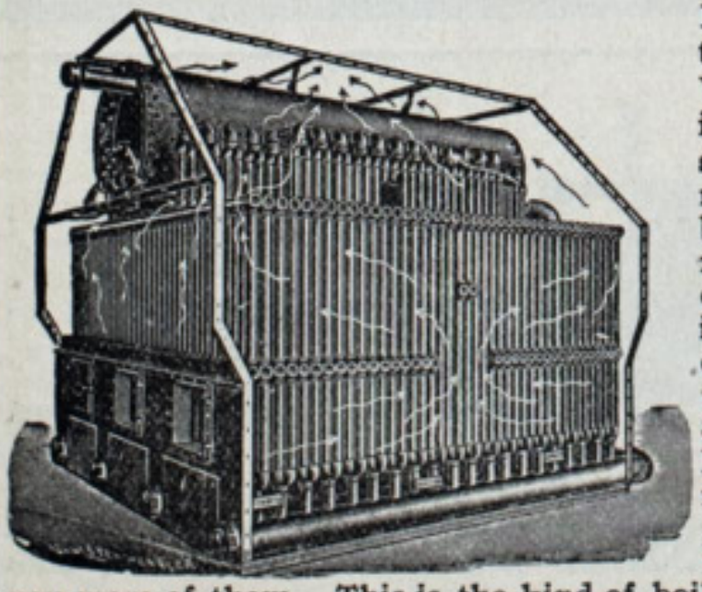

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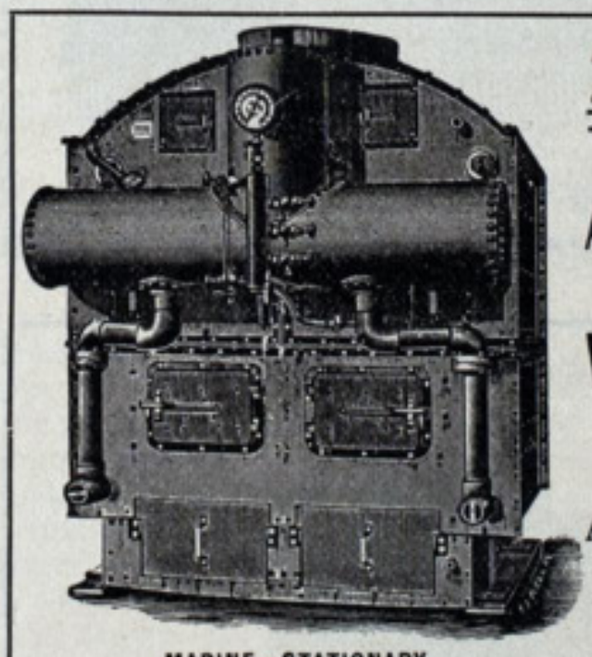

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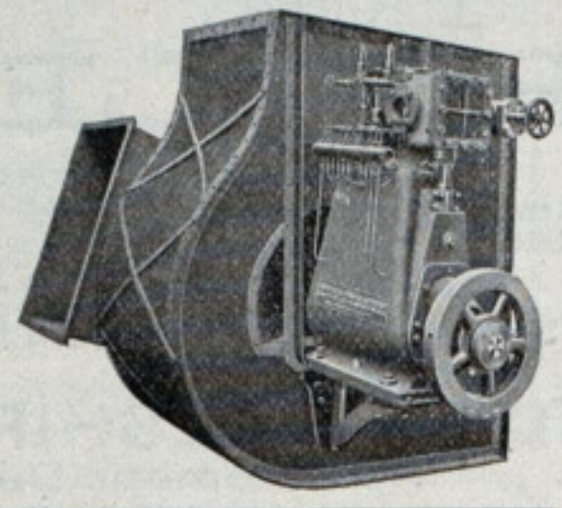

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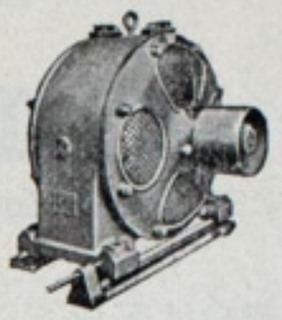

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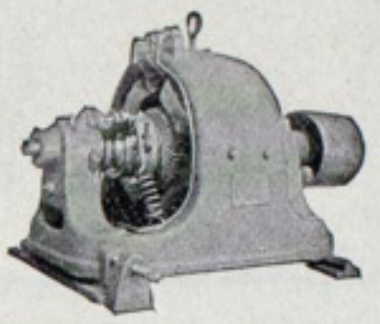

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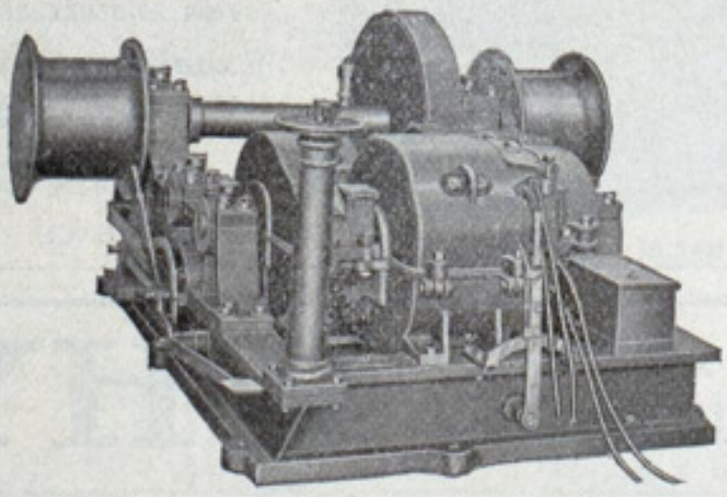

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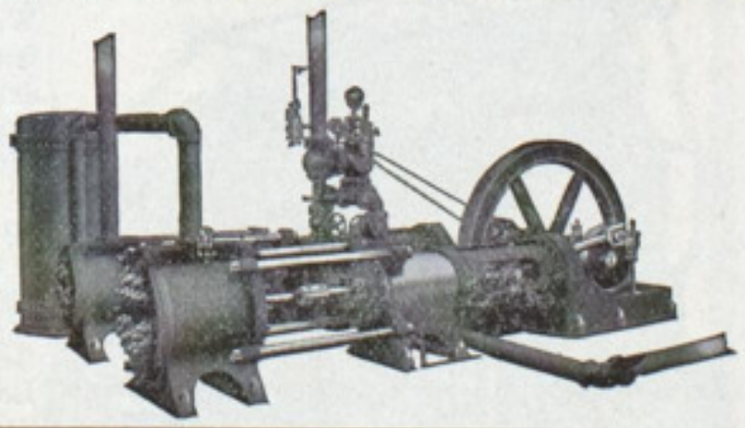

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